FEDERAL COAL-MINE INSPECTION --
A DECADE OF PROGRESS

ANNUAL REPORT FOR FISCAL YEAR 1951 AND 10-YEAR REVIEW

BY J. J. FORBES, N. J. ANKENY, AND H. F. WEAVER

* * * * * * * * * * Information Circular 7625

UNITED STATES DEPARTMENT OF THE INTERIOR
Oscar L. Chapman, Secretary
BUREAU OF MINES
J. J. Forbes, Director

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Annual Report for Fiscal Year 1951 and 10-Year Review

by

J. J. Forbes,[1] M. J. Ankeny,[2] and H. F. Weaver[3]

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INTRODUCTION

The Coal Mine Inspection Branch of the Health and Safety Division, Bureau of Mines, was established to carry out the provisions in Public Law 49, 77th Congress, H. R. 2082, approved May 7, 1941. The series of major disasters that beset the coal-mining industry in 1940 aroused public interest in mine-safety measures, and the act is the direct result of this rekindled interest.

Under the provisions of the act, the Secretary of the Interior, acting through the Federal Bureau of Mines, is authorized and empowered to make, or cause to be made, annual or necessary inspections and investigations in coal mines, the products of which regularly enter commerce or the operations of which substantially affect commerce. The principal functions of the Federal coal-mine inspectors are to determine the causes of accidents and occupational diseases in coal mines and then endeavor to eliminate or ameliorate them (1) by revealing, through personal conferences with mine personnel, correspondence, and published reports, the unhealthful and unsafe conditions and practices existing in the mines and (2) by recommending practical means for correcting the conditions observed. The act does not provide any enforcement powers, and therefore compliance with the inspectors' recommendations is not mandatory; it does give Federal coal-mine inspectors the right to enter coal mines for inspection purposes.

The act authorizes and directs the Secretary of the Interior, acting through the Bureau of Mines, to expend the funds made available to him for protective or advancing health or safety in coal mines and for the prevention or relief of accidents or occupational diseases therein, in such lawful manner as he may deem most effective in the light of the information obtained under the act to promote the accomplishment of the objects for which such funds are granted. To comply with such directive, the Coal-Mine Inspection Branch personnel is conducting Nation-wide safety-educational programs for coal-mine officials and coal-mine workmen. In addition, special studies are made of mine health and safety problems relating to roof control, haulage, ventilation, mine disasters, dusts, explosives, electricity, etc.; the results of such studies and any improved methods determined from them are made available to the mining industry and general public through published reports.

The National Bituminous Coal Wage Agreement between the United Mine Workers of America and Bituminous-Coal Operators became effective March 5, 1950, and expires June 30, 1952; it provides in part as follows:

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(a) Mine Safety Code.

The Federal Mine Safety Code for bituminous-coal and lignite mines of the United States, adopted pursuant to an agreement dated May 29, 1946, between the Secretary of the Interior and the President of the United Mine Workers of America and promulgated July 24, 1946, is hereby adopted and incorporated by reference in this contract as a code for health and safety in bituminous-coal and lignite mines---.

(b) Enforcement.

(1) Reports of Federal Coal Mine Inspectors:- Wherever inspectors of the Federal Bureau of Mines, in making their inspections in accordance with authority as provided in Public Law 49, 77th Congress, find that there are violations of this code and make recommendations for the elimination of such noncompliance, the Operator shall promptly comply with such recommendations, except as modified in paragraph two of this subdivision (b).

(2) Whenever either party to the contract feels that compliance with the recommendations of the Federal Mine Inspectors as provided above would cause irreparable damage or great injustice, they may appeal such recommendation to the Joint Board of Review as hereinafter provided.

The Anthracite Wage Agreement became effective March 16, 1950, and expires June 30, 1952; it provides in part as follows:

Mine Safety Program.

(a) Federal Mine Safety Standards.

Inspectors of the Federal Bureau of Mines shall make periodic investigations of the mines, and report to the mine management and the United Mine Workers of America any violations of the Federal Safety Standards.

Operators and Mine Workers agree to accept such standards of safety adaptable and practical to the anthracite industry, subject, however, to the right of review by the Director of the Federal Bureau of Mines, upon petition from the Operator or the United Mine Workers of America.

CONCLUSIONS

This year marks the tenth anniversary of Federal inspection of coal mines under Public Law 49 and presents the opportunity to tell what has been accomplished in the last decade to improve health and safety conditions and practices in the coal-mining industry. The effectiveness of the work done by all concerned in this endeavor is revealed in part by comparing the injury records attained before and after the year 1941 when the act became effective.

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During the 9 years before Federal inspection of coal mines, 2,046 men were killed in the anthracite mines of Pennsylvania, and the average number of fatalities per million man-hours exposure was 1.61. During the first 9 calendar years of operation under Public Law 49, 1,437 men were killed and the rate was 1.13. On a percentage basis, this means a reduction of 30 percent in the number of fatalities and of 30 percent in the average fatality rate as shown in table 3 of appendix G.

During the 9 years before Federal inspection of coal mines, 134,368 nonfatal lost-time injuries occurred in the anthracite mines of Pennsylvania, and the average number of nonfatal injuries per million man-hours exposure was 105.71. During the first 9 calendar years of operation under Public Law 49, 103,166 nonfatal injuries occurred and the average rate was 80.97. On a percentage basis, this means a reduction of 23 percent in the number of nonfatal injuries and a reduction of 23 percent in the average nonfatal-injury rate.

During the 9 years before Federal inspection of coal mines, 9,078 men were killed in the bituminous-coal and lignite mines of the United States, and the average number of fatalities per million man-hours exposure was 1.45. During the first 9 calendar years of operation under Public Law 49, 8,025 men were killed, and the average rate was 1.19. On a percentage basis, this means a reduction of 10 percent in the number of fatalities and of 18 percent in the average fatality rate.

During the 9 years before Federal inspection of coal mines, 407,787 nonfatal lost-time injuries occurred in the bituminous-coal and lignite mines of the United States, and the average number of nonfatal injuries per million man-hours exposure was 65.22. During the first 9 calendar years of operation under Public Law 49, 388,555 nonfatal injuries occurred, and the average rate was 56.27. On a percentage basis, this means a reduction of 5 percent in the number of nonfatal injuries and a reduction of 14 percent in the average nonfatal-injury rate.

Attention is drawn to the fact that, generally, injury rates were on an upward trend during the 9 years before Federal inspection of coal mines was begun, but during the 9 calendar years of Federal inspection the trend was downward; under such circumstances, a comparison of average rates attained before and after Federal inspection was commenced is misleading and does not represent a true picture of the facts. The true picture is revealed by graphs that depict the general trend in injury rates, and such trends are now discussed.

The general trend in fatal injuries per million man-hours exposure, portal to portal, in the anthracite mines of Pennsylvania was upward during the 9 years before 1941. In 1942 the trend was reversed and has been favorable ever since, as indicated in figure 1 of appendix G. The fatality rate of 0.75 in 1950 was the best annual record in the statistical history of anthracite mining.

The general trend in nonfatal injuries per million man-hours exposure, portal to portal, in the anthracite mines of Pennsylvania was upward before 1941. However, since that year the trend has been downward, and by 1950 the rate reached an all-time low of 71.72, as shown in figure 2 of appendix G.

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The general trend in fatal injuries per million man-hours exposure, portal to portal, in the bituminous-coal and lignite mines of the United States was upward during the 9 years before 1941. Since then, the trend has been downward, and in 1949 the record-low rate of 0.92 was attained, as indicated in figure 3 of appendix G.

The general trend in nonfatal injuries per million man-hours exposure, portal to portal, in the bituminous-coal and lignite mines of the United States has been favorable since 1935, as shown in figure 4 of appendix G. The all-time low of 47.83 was attained in 1950.

A record of the number of fatal and nonfatal injuries that have occurred in the coal mines of the United States since 1932 is shown in table 1 of appendix G. The low mark of 593 killed in 1949 (16 of which occurred at strip mines) was realized during an exposure of approximately 581 million man-hours at underground mines and 61 million man-hours at strip mines. In 1939, when the tonnage produced was about the same as that mined in 1949, 1,078 persons were killed (9 at strip mines) during an exposure of approximately 736 million man-hours at underground mines and 24 million man-hours at strip mines. A comparison of the data for these 2 years reveals a decrease of 45 percent in the number of fatalities, with a decrease of only 16 percent in the man-hours of exposure, and indicates that progress is being made in reducing mine injuries.

The number of major coal-mine disasters in the United States and the fatalities resulting from them are listed for each year since 1932 in table 2 of appendix G. A major disaster is defined as any accident that causes the death of 5 or more persons, and it is gratifying to report that no such disaster occurred in the coal mines of this country from November 4, 1948, to January 18, 1951, an unprecedented disaster-free period.

Major improvements made in coal mines during the last 10 years contributed much to the favorable decrease in the injury rates. The records show that a systematic roof-support plan was adopted in 1,866 mines; the use of dangerous black powder was discontinued in 1,037 mines; new main fans were installed at 2,010 mines; auxiliary blower fans with tubing were removed from 473 mines; preshift examinations for gas and other dangers were begun in 2,147 mines; on-shift examinations for gas were begun in 1,688 mines; the use of water to allay dust was initiated in 867 mines; 1,407 mines were rock-dusted for the first time; second openings were provided in 660 mines; smoking was discontinued in 1,186 mines; and the use of open lights was discontinued in 1,049 mines. (For reference, see appendix H.)

Credit for the favorable results attained during the past 10 years cannot be ascribed rightfully to the efforts of any one group or agency, but it is well-known that Federal activities under Public Law 49 have been, and continue to be, a great influence in giving deserved attention to health and safety in coal mines. The cooperative efforts of management, labor, State inspection agencies, manufacturers of mining equipment, coal operators' associations, the Federal Bureau of Mines, and other agencies interested in mine safety have brought about the improvements in conditions and practices that have resulted in a reduction in coal-mine injuries.

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The Bureau of Mines has made the following contributions toward the many improvements in coal mines that have had a desirable effect on health, safety, and injury records:

1. There are approximately 8,400 active coal mines in the United States. In all, 41,986 regular Federal inspections of coal mines have been made since Public Law 49 became effective in May 1941; 8,971 of these inspections were made during the fiscal year ended June 30, 1951. Currently, funds are being appropriated for the employment of 250 coal-mine inspectors to perform the inspection and related work.

2. The revised Coal-Mine Accident-Prevention Course for Supervisors was introduced in the coal-mining industry by the Bureau of Mines on March 1, 1948. Since that date, 12,276 supervisors and those aspiring to official positions have completed such training conducted by mining engineers of the Coal-Mine-Inspection Branch employed for that purpose.

3. The revised Coal-Mine Accident-Prevention Course for Miners was introduced in the coal-mining industry by the Bureau of Mines on January 1, 1947. Since that date, 34,832 mine workers have completed such training, conducted by Federal coal-mine inspectors assigned temporarily to educational work.

4. A Coal-Mine-Haulage Safety Course was introduced in the coal-mining industry on April 1, 1951, by the Bureau of Mines. During the 3 months remaining in the fiscal year 1951, 8,538 haulage employees and others completed such training conducted by Federal coal-mine inspectors.

5. A Roof-Fall Accident-Prevention Course was initiated by the Bureau of Mines in May 1951. The course was completed during the fiscal year and will be introduced to the industry by Federal coal-mine inspectors during the fiscal year 1952. This course is designed to impress upon mine officials and workmen the need for more adequate roof-control measures and to make all concerned more roof-conscious.

6. The Federal Mine Safety Code for Bituminous-Coal and Lignite Mines of the United States was issued by the Director of the Bureau of Mines on July 24, 1946, after consultation with management and labor representatives of the coal-mining industry. This code has been used by Federal coal-mine inspectors during their inspection of bituminous-coal and lignite mines as a basis for determining the existence of unhealthful and unsafe conditions and practices in these mines. Under the agreement of May 29, 1946, between the Secretary of the Interior, acting as Coal-Mines Administrator under authority of Executive Order 9728, and the United Mine Workers of America covering bituminous-coal and lignite mines in Government possession, Federal coal-mine inspectors were charged with the responsibility of making periodic investigations of the mines and reporting to the Coal-Mines Administrator any violations of the Federal Mine Safety Code. They were active in making prompt investigations of hazardous mines that had been closed by order of the Coal Mines Administrator to determine whether enough improvements had been made to allow the mines to reopen. Federal coal-mine inspectors also had authority to close mines they found to be imminently dangerous, but such authority was removed on June 30, 1947, when Government control of the mines ended.

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7. The Safety Standards for Anthracite Mines were prepared by personnel of the Bureau of Mines and are used by Federal coal-mine inspectors as a basis for determining unhealthful and unsafe conditions and practices during their inspections of the anthracite mines of Pennsylvania.

8. Public Law 328 - 80th Congress, Chapter 450 - 1st Session, effective for 1-year following its approval on August 4, 1947, required the Secretary of the Interior, acting through the Director of the Bureau of Mines, to submit quarterly reports to the Congress of the United States with respect to the conditions of all bituminous-coal and lignite mines inspected by Federal coal-mine inspectors, all recommendations and notices to the State agencies, and action taken by such mine owners, operators, and the State agencies with respect to his findings and recommendations.

9. Introduction of the bolting method of roof control to the coal-mining industry by the Bureau of Mines in 1948 is a major contribution toward reducing coal-mine accidents. Falls of roof and coal cause more than half the fatalities in coal mines of the United States, and there was no general departure from the orthodox method of roof support by timbering until 1948, when the Bureau of Mines perfected and generally introduced the roof-bolting method of controlling mine roof. The efficiency, practicality, and economy of roof bolting are indicated by the fact that, in the short term of 3 years, 494 coal mines and 54 noncoal mines have adopted this method of roof control to various extents; in some large mines bolts are used exclusively for controlling the roof. The success of this new method of roof control shows that it is likely to surpass the use of rock dust as a means of preventing loss of life and serious injuries in coal mines. Certain Federal coal-mine inspectors who have been especially trained in mine roof control and roof bolting are in constant demand by mine operators to determine if roof bolting is practical and, if so, to recommend a plan of bolting suitable to the conditions in their respective mines.

Before roof-bolting is begun in any mine, the Bureau of Mines makes the following recommendations:

Controlled experiments to determine whether roof bolting is applicable should be made in conformance with procedures worked out by the Bureau of Mines. Bureau experiments are made under controlled conditions, with auxiliary conventional supports during the initial experimentation. After a safe and economical method of bolting is determined, no deviation from this method should be made without a new experimental period. Also, if roof conditions change radically from those encountered during the initial experimental period, there should be a new experimental period.

The advent of roof bolting brought with it the health hazard from dusts produced during drilling in roof rock. The Bureau has been active in eliminating this hazard by cooperating with manufacturers of mining equipment in designing effective dust collectors that may be used in lieu of water to allay such dust at its source.

10. Federal coal-mine inspectors began investigating all coal-mine fatalities by order of Bureau of Mines Director James Boyd on March 10, 1950. The reports of these investigations are made available to industry, and the information in them is summarized and published annually with the hope that it will be helpful in preventing accidents in coal mines.

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11. Special studies covering roof control, explosives, fires, explosions, mining, electricity, haulage, ventilation, and control of atmospheric dusts are being made continually as part of the health and safety program set up under the Coal Mine Inspection and Investigation Act (Public Law 49). Reports of findings and recommendations are made available to the coal-mining industry.

12. Since 1947 personnel of the Bureau of Mines has assisted in preparing proposed revisions of the coal-mining laws of 12 States. Such revisions have been adopted in Alabama, Colorado, Maryland, Montana, Tennessee, and Wyoming. The Bureau of Mines will continue to furnish this service to any agencies directly concerned with improving State mining laws, such as labor organizations, coal-operators' associations, and State officials. This contribution is another major and vitally important step taken by the Bureau of Mines to fulfill its obligation to the coal-mining industry.

Despite all these influences and the improvements in conditions and practices, far too many men are being injured and killed in coal mines. The coal mines in the United States are in better condition from the standpoint of health and safety than at any other time in the history of the industry; however, much remains to be done before the conditions in many mines can be considered even fairly satisfactory. During the fiscal year ended June 30, 1951, Federal coal-mine inspectors reported an average of 19 unsafe conditions and practices per mine inspected; 49 percent of the inspection reports transmitted during the year indicated dangers of a serious nature that were not corrected, and only 27 percent of all the dangers reported by Federal coal-mine inspectors were corrected during the year, as indicated in appendix J and appendix K. These data are evidence that more incentives, more safety training, additional technologic improvements, and more adequate and modern State mining laws are needed to reduce the incidence of coal-mine accidents further.

An additional incentive would be provided if Federal coal-mine inspectors were given authority to order withdrawal of men from a mine or any part of a mine in which serious danger exists if prompt action is not taken to eliminate the danger. The time to eliminate unsafe conditions and practices is when they are discovered - even a minimum of delay may result in tragedy that could be avoided by removing persons from the unsafe area.

The 1950 fatality record for the coal-mining industry was the best ever attained; it can be improved by constant prodding, proper training, effective planning, and determined cooperative efforts.

THE ADVISORY COMMITTEE

Section 8 of Public Law 49 provides for the appointment of an Advisory Committee composed of not more than six members to exercise consultative functions, when required by the Secretary of the Interior, in connection with the administration of the act. The following persons constitute the present members of the Committee:

Thomas Kennedy, vice president, United Mine Workers of America, Washington, D. C.

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W. A. Boyle, assistant to the president, United Mine Workers of America, Washington, D. C.

John T. Jones, president, District 16, United Mine Workers of America, Washington, D. C.

L. C. Campbell, vice president, Eastern Gas & Fuel Associates, Coal Division, Pittsburgh, Pa.

Harry Treadwell, president, Chicago, Wilmington, & Franklin Coal Co., Chicago, Ill.

E. C. Weichel, vice president, The Hudson Coal Co., Scranton, Pa.

Meetings of the committee have been held:

Sept. 3, 1941, at Washington, D. C.

Dec. 3, 1941, at Pittsburgh, Pa.

May 12, 1942, at Washington, D. C.

Nov. 5, 1942, at Washington, D. C.

Jan. 28, 1946, at Washington, D. C.

Oct. 3, 1950, at Washington, D. C.

EMPLOYMENT OF PERSONNEL

Coal-mine inspectors and engineers of the Coal-Mine Inspection Branch are selected from the Civil Service register, and applicants must meet the rigid requirements set up by the United State Civil Service Commission before their names can be included in the register.

The current requirements for the several grades of Federal coal-mine inspector are as follows:

United States Civil Service Commission Requirements for Federal Coal-Mine Inspectors

Sample of Work

Applicants must submit with their application a 250-word description of some phase of coal mining, such as a description of the ventilating system, haulage system, or timbering methods used in a mine familiar to the applicant. The description must be prepared by the applicant, and he must certify in his own handwriting that he received no assistance in composing it. Applicants who fail to submit this sample of their work or who submit unsatisfactory samples will receive no further consideration.

Experience

Applicants must show, as a minimum, the quality and amount of experience prescribed below unless they substitute education for experience (see Substitution of Education for Experience below). To establish eligibility in any

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grade, at least 1 year of the required experience for that grade must have been acquired during the 5 years immediately preceding the date of filing application. This recency-of-experience requirements will be waived for applicants whose qualifying experience was interrupted by service in the Armed Forces of the United States after May 15, 1940.

GS-9, $4,600 - Six years of progressive experience in practical coal mining, of which at least 2 years must have been specialized experience in coal-mining operations of moderate difficulty, which involved responsibility for providing and applying adequate modern safety and health programs in coal mines in a position of at least the responsibility required of a mine superintendent, mine foreman, mining engineer, or safety inspector. The nature of the experience must have been such as to demonstrate initiative, resourcefulness, and ability to perform important coal-mine inspection work under only general supervision.

GS-11, $5,400 - Seven years of progressive coal-mining experience, of which 3 or more years must have been specialized experience that required supervision of difficult, important, and responsible work, subject only to general supervision and review, in a position of at least the responsibility required of a mine superintendent, mine foreman, mining engineer, or safety engineer. The experience must have included the direction, application, and enforcement of modern coal-mine safety and health programs. This experience must also have demonstrated that the applicant has (1) a thorough knowledge of the basic principles applicable to modern programs for promotion of safety and health in coal mines; (2) the resourcefulness, initiative, and ability to perform, direct, and coordinate moderately large scale mine-inspection work of considerable difficulty; and (3) administrative ability, tact, and judgment necessary to conduct conferences in promotion of programs for improved safety, health, and working conditions in coal mines.

GS-12, $6,400 - Eight years of progressive experience in the various operations necessary in exploration, development, and production in coal mines, including at least 4 years of very difficult, important, and responsible specialized work that was subject to only general administrative supervision, in a capacity such as direct supervisor. This work must have included full responsibility for directive and applying modern coal-mine safety and health programs. This experience must have demonstrated that the applicant has (1) a thorough knowledge of basic principles applicable in modern programs for promotion of health and safety in coal mines; (2) the resourcefulness, initiative, and ability required in a position of at least the responsibility of mine manager, mine superintendent, mining engineer, or safety engineer; (3) the ability to perform, direct, and coordinate large-scale mine-inspection work of unusual difficulty; and (4) administrative ability of a high order, along with the tact and judgment necessary to conduct important conferences with interested parties, such as coal-mine operators, labor organizations, and the general public on matters related to safety and health of workers engaged in coal mining.

Provisions of Law

Section 9 of the Coal Mine Inspections and Investigations Act under which those positions are established provides:

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That in the selection of persons for appointment as coal-mine inspectors no person shall be so selected unless he has the basic qualification of at least 5 years' practical experience in the mining of coal, and is recognized by the United States Bureau of Mines as having the training or experience of a practical mining engineer in those essentials necessary for competent coal-mine inspection.

The provisions of law quoted above are made a part of the requirements of this examination. Persons whose qualifications are not such as to receive the recognition of the Bureau of Mines as required by law cannot be accorded an eligible rating in this examination.

Part-Time or Unpaid Experience

Credit will be given for all valuable experience of the type required regardless of whether compensation was received or whether the experience was gained in a part-time occupation. Part-time or unpaid experience will be credited on the basis of time actually spent in appropriate activities. Applicants wishing to receive credit for such experience must indicate clearly the nature of their duties and responsibilities in each position and the number of hours a week spent in such employment.

Substitution of Education for Experience

Successfully completed courses of study in engineering at a college or university of recognized standing may be substituted for part of the required general experience on the basis of 1 year of education for 6 months of experience. Such substitution will be limited to 1 year of required general experience in GS-9 grade and to 2 years of required general experience in the GS-11 and GS-12 grades.

Ability to Drive Automobile

Applicants must give evidence that they can drive an automobile.

Physical Ability

Applicants must be physically capable of performing efficiently the arduous duties of this position. They must be free of defects or diseases that may constitute employment hazards to themselves or endanger fellow employees or others. They must be capable of sustained physical exertion for 6 to 8 hours per day under hazardous conditions, such as walking over rock falls or steep pitches, in adverse atmospheric conditions, or under low roof where it is frequently necessary to crawl on the hands and knees. In emergencies following a mine disaster they may be required to work for as long as 2 hours at a time carrying mine rescue apparatus, which weighs about 40 pounds. Vision must be at least 20/50 snellen in one eye and 20/70 in the other without glasses. The ability to distinguish basic colors is essential. Hearing, with or without a hearing aid, must be acute enough to enable the applicant to hear ordinary conversation at 20 feet. These standards must be met by all applicants; however, certain requirements may be waived for veterans who can demonstrate ability to perform duties efficiently and safely.

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In view of the strenous physical exertion required in this occupation, hernia (whether or not supported by truss), organic heart disease (whether or not compensated), varicose veins (unless slight), serious deformities or disabilities of extremities (including weak feet), mental or nervous disease, chronic respiratory or chronic constitutional disease, or other physical defects that would cause the applicant to be a hazard to himself or to others or which would prevent efficient performance of the duties of the position will disqualify him for appointment.

Applicants will be required to submit a certificate of physical examination made by a doctor designated by the United States Civil Service Commission. The personnel officer has authority to approve a medical certificate, but such a certificate may be rejected only by physicians of the United States Civil Service Commission. Persons who are offered appointment must pay their own expenses in reporting for duty.

Citizenship

Applicants must be citizens of or owe allegiance to the United States and must not have passed their forty-eighth birthday on the date of filing application. This age limit does not apply to persons entitled to veteran preference.

Basis of Ratings

No written test is required. Applicants' qualifications will be rated on a scale of 100 and will be judged from a review of their experience, education, and training and on corroborative evidence secured by the Commission. Applicants may be required to present to the Commission proof of qualifications claimed but should not submit such proof unless it is requested by the Commission. Exaggeration or misstatement or the submission of a sample of written work that is not the applicant's own will cause disqualification or later removal from the service.

United States Civil Service Commission
Basic Requirements for Mining Engineers

Applicants for the position of mining engineer must have completed successfully a full 4-year professional curriculum leading to a bachelor's degree in an accredited college or university or have had 4 years of successful and progressive experience in technical engineering comparable to that which would have been acquired through successful completion of a full 4-year engineering curriculum in an accredited college or university.

Tentative Selection and Probational Appointment

After a coal-mine inspector or engineer has been selected from the Civil Service register for possible employment, he is interviewed by a Bureau of Mines official to determine his fitness for the position. If the interview discloses that the applicant is unsuitable for employment, he is no longer considered for the position. If the applicant is considered favorably and has passed the required medical examination, he is given a probational appointment of 1 year duration. Probationers who do not measure up to Bureau of Mines standards are dismissed from the service in accordance with Civil Service regulations.

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TRAINING OF PERSONNEL

Inspectors and engineers usually are given a 4-week course of intensive training in technical matters and Bureau policy at the Bureau of Mines Central Experiment Station, Pittsburgh, Pa., before being assigned to field headquarters. However, in those instances when one inspector is employed to replace an inspector who leaves the service, the new inspector is given on-the-job training first by accompanying an experienced inspector and completes the 4-week training course at Pittsburgh as soon as enough replacements are employed to constitute a class.

The classwork includes lectures, demonstrations, and laboratory work covering such vital subjects as roof control, haulage, mine rescue training, first-aid training, causes and prevention of mine fires andexplosions, mine gases and methods of detection, mine electricity, ventilation, explosives, methods of collecting and analyzing dust and air samples, method of conducting a coal-mine inspection, method of preparing inspection and investigation reports, operation of automobiles, and general policy matters.

Inspectors who complete the course of training immediately after they are employed are required to accompany experienced inspectors until they have demonstrated their ability to conduct inspections without immediate supervision. New inspectors are admonished to go slowly with their first inspections and to be very careful and thorough so hazards are not overlooked. The need for thoroughness is emphasized throughout the training period and is re-emphasized from time to time thereafter, so that there is no misunderstanding of Bureau policy.

One or more coal-mine inspectors of outstanding ability are assigned in each Bureau of Mines region to assist the field officials in supervising the coal-mine inspectors under their jurisdiction. The supervising inspectors accompany the regular inspectors, instruct them when necessary to improve the quality of their work, and submit reports of their observations for critical review and appropriate action.

ORGANIZATION

The Coal-Mine-Inspection Branch was allotted $2,539,208 for the fiscal year ended June 30, 1951, which provided for the employment of 250 coal-mine inspectors, 22 mining engineers; 5 mining-electrical engineers; 5 mining-explosives engineers; a staff of stenographers, clerks, and miscellaneous employees in the field; and administrative officials, mining engineers, and clerical employees in the departmental service. The name, occupation, and headquarters of each employee of the Branch as of June 30, 1951 are included in Appendix A of this report.

The Health and Safety Division of the Bureau of Mines, of which the Coal-Mine-Inspection Branch is a unit, is headed by J. J. Forbes; M. J. Ankeny is chief of the Coal-Mine Inspection Branch. During the fiscal year 1950, the Bureau of Mines was reorganized on a regional basis, and the field personnel of the branch is under the direct supervision of the regional directors and their official assistants. The departmental staff is concerned largely with formulating programs, developing standards for carrying out these programs by the field organization, and coordinating all of the division's activities. The headquarters staff is charged, among other things,

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with the responsibility of considering carefully program and project proposals (which may originate with the staff or with the regional directors) and then developing and correlating programs and production quotas for the various regions that will have an over-all national scope. When approved by the Director of the Bureau, such programs are carried out under the supervision of appropriate regional directors. The work performed under the regional director is subject to review and suggestions by the Director's staff.

To assist the headquarters staff in determining the efficiency of the various field units and to provide the field personnel with production targets, the Director's staff initiated in 1951 a program-control quota system covering inspections of mines, accident-prevention training, fatal and nonfatal injuries, and injury rates. This first year of operation under the quota system was successful, and the system will be continued and expanded as needed.

The coal-mine inspectors and engineers of the branch are headquartered at strategic places in the coal-producing areas in the United States.

INSPECTION PROCEDURE

A standard procedure for inspecting coal mines under Public Law 49 has been established and, briefly, is as follows: Generally, notification of an inspection is not given to the mine operators or to the miners. The inspection may require from a day to several weeks, depending on the size of the mine, the thickness and pitch of the coal beds, the system of mining, the degree of concentration of working places, prevalence of hazardous conditions and practices, and other conditions. The inspector is required (a) to inspect the surface plant, every working place in the mine, all active haulageways, entrances to abandoned workings, accessible old workings, airways, escapeways and other places where men work or travel or where dangerous conditions may exist, electric equipment and installations, haulage facilities, first-aid equipment, ventilation facilities, communication installations, roof and rib conditions, blasting practices, etc.; and (b) to make tests for gas and oxygen deficiency in all mines and to collect samples of mine air and mine dusts for chemical analysis, if necessary, to determine precisely the conditions with respect to noxious and explosive gases, oxygen content, and coal and rock dust.

In multiple-shift operations the inspector is required to devote part of his time to inspection on each shift so hazards are not inadvertently overlooked.

Each coal-mine inspector is assigned a district comprising mines that he inspects regularly. This procedure was adopted in 1948 and has resulted in a greater personal interest on the part of the inspector to have the mines under his jurisdiction in the safest condition possible and to keep accidents in them to a minimum. Inspectors are responsible for devising ways and means of reducing accidents in their respective districts, and they are required to improve the effectiveness of their inspections by:

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a. Determining the outstanding causes of accidents at the mine to be inspected; this information is used during the inspection as a guide in observing hazards.

b. Discussing observed hazards and means of correction with the accompanying official at the time the hazard is discovered, with the mine-safety committeemen when feasible, and with high company officials when a conference can be arranged.

c. Enlisting the cooperation of labor, management, State inspection personnel, and all other safety-promotion agencies.

d. Becoming acquainted with management, the officials of the mine workers' organization, and the mine safety committeemen.

e. Spending enough time at the active working faces to observe, wherever practicable, a complete cycle of operations of timbering, cutting, drilling, blasting, loading, hauling, etc.

f. Attending local union meetings occasionally to discuss safety with the members and endeavoring to promote cooperation in accident-prevention work generally after regular working hours.

g. Participating in mining institutes, Holmes Safety Association chapters and councils, and other agencies dedicated to the promotion of mine safety, generally after regular working hours.

h. Assuming a personal interest and a definite personal responsibility in the prevention of accidents.

i. Investigating all fatal coal-mine accidents in their respective districts.

j. Assisting in the investigation of mine explosions and fires. The Federal Mine Safety Code is used as a basis for determining unsafe and unhealthy conditions and practices in the bituminous-coal and lignite mines of the United States. The Safety Standards for Anthracite Mines are used as a basis for determining unsafe and unhealthy conditions and practices in the anthracite mines of Pennsylvania.

PROCEDURE FOR PREPARING AND DISTRIBUTING COAL MINE INSPECTION AND INVESTIGATION REPORTS

A preliminary report and a final report are prepared by the inspector in accordance with standard regulations following the completion of each regular inspection of a coal mine.

A preliminary report, indicating unsafe conditions and practices considered of primary importance, is prepared by the inspector and posted by him at the mine within 1 day following completion of the inspection. Typed copies of the preliminary reports are distributed by the field offices of the Bureau of Mines to the mine officials, the State mine-inspection agency, the district

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and national offices of the mine workers' organization having jurisdiction at the mine, the Washington office of the Bureau of Mines, and the Geological Survey if the mine is on the public domain or Indian land.

A final report on each inspection is prepared by the inspector promptly after the preliminary report has been completed; it contains a general description of the property and of conditions and practices observed during the inspection. All unsafe conditions and practices are recorded in detail, and proper recommendations are made to correct them. Results of chemical analysis of dust and air samples collected during the inspection are listed in the report to provide additional information with respect to conditions in the mine.

Final reports on inspections of all coal mines are prepared, reviewed, and mimeographed in the field offices and are distributed from there to management, the State mine-inspection agency, the national and district office of the mine workers' organization, the Joint Industry Safety Committee (bituminous-coal mines that are affiliated with the U.M.W.A.), the Washington office of the Bureau of Mines, and the Geological Survey if the mine is on the public domain or Indian land. Before July 1, 1949, only reports on small mines were distributed direct from the field offices; reports on larger mines were given a final review in Washington before transmittal to mine operators, etc. On July 1, 1949, the present system of distributing all reports direct from the field offices was begun to conform to the Department's decentralization and regional plans and also to reduce the lapse of time between completion of inspections and transmittal of final inspection reports. As a result of this change in policy, the average time, in calendar days, between completion of inspections and transmittal of the final reports was reduced from 17.2 days in June 1949 to an average of 8.7 days for the fiscal year ended June 30, 1951.

Reports are reviewed in the Washington office after they have been transmitted to all concerned to assure that the rules for preparing and distributing reports are being followed and to obtain information on serious hazards that are called to the special attention of the heads of the companies.

A press release covering salient features of certain reports is prepared and sent to the newspapers in the area where the mine is situated.

The posting and distributing of the reports, the press releases covering them, and the filing of the reports in the Bureau of Mines field and Departmental offices for public inspection constitute compliance with section 6 of the act requiring publication and dissemination of findings.

Reports on explosives surveys, electrical surveys, ventilation surveys, and dust surveys made by inspectors and engineers of the Branch usually are transmitted only to officials of the mine, because the technical information in these reports is of particular interest to the mine operators and Bureau of Mines personnel; however, the reports are available in the Bureau offices for public inspection. On numerous occasions such surveys are made at the request of mine operators who are interested in improving the safety, health, and efficiency of their mines and related facilities.

Reports covering the investigation of all fatal coal-mine accidents and of major and minor coal-mine disasters are prepared, and they are distributed

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by the field office to all agencies and persons that ordinarily would receive copies of the regular inspection reports.

FOLLOW-UP PROCEDURE

Inasmuch as the Federal coal-mine inspectors have no authority under Public Law 49 to require compliance with their recommendations, every reasonable and practical effort is made to get unsafe conditions and practices corrected. One method is to enlist the cooperation of State mine-inspection agencies that generally have authority to require the correction of hazards, and the procedure is as follows: When an inspector observes unduly hazardous conditions or practices during inspection of a mine, he informs the local mine officials. If prompt action is not taken to correct the hazards, he so advises the mine-safety committeemen and also the Bureau of Mines official in charge, who promptly relays the information to the State mine inspector and the head of the State mine-inspection agency by telephone (confirmed by letter) or by letter only, as the exigencies of the case warrant. Such procedure has resulted in elimination of many very serious hazards in the mines.

Another follow-up procedure is initiated in the Bureau's Washington office. As indicated before, the inspection reports are given careful scrutiny as soon as they reach the Washington office. Serious hazards that are known to have caused heavy loss of life or destruction of property in coal mines and the recommendations for their correction are capitalized in the final report to call special attention to them. To assure that the high officials of the company are aware of all serious hazards, a letter listing them and appealing for their correction is sent to the president of the company by the chief of the Health and Safety Division in Washington.

The condition of many of the coal mines in the Nation is evident when it is known that 49 percent of all inspections made during this fiscal year revealed hazards serious enough to justify sending a special notice to the head of the State mining agency and also to the president of the operating company. Eleven percent of such letters were answered by the company presidents, and in the majority of instances they assured that the hazards had been or were being corrected. These letters serve a twofold purpose: The high officials who may not have time to read the detailed inspection reports are apprised of the most serious hazards by a letter that they can read in a few minutes, and the local mine officials have come to realize that the serious hazards are called to the special attention of top management and, to avoid being criticized, make a greater effort to correct unsafe conditions and practices when they exist or are developing instead of waiting until they are reported by a Federal inspector. Records regarding serious hazards in coal mines are included in appendix B of this report.

Follow-up inspections are made of the very hazardous mines to attempt to convince the mine officials and miners of the seriousness of conditions.

Such follow-up procedures undoubtedly have exerted a considerable influence on the improvement in practices and conditions in many mines and on the favorable reduction in coal-mine injury rates.

During this fiscal year 27 coal mines were found to be free of violations of the Federal Mine Safety Code or of the Safety Standards for Anthracite Mines at the time the Federal inspection was being made, as shown in appendix I.

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REGULAR INSPECTION WORK ACCOMPLISHED

According to a Bureau of Mines survey, approximately 8,383 coal mines were operated more or less regularly during the fiscal year. A tabulation showing the approximate number of coal mines (by types, employment groups, and States) operated in 1951 is included in appendix D of this report.

Reference to the performance data in appendix E will reveal that:

a. 8,971 regular inspections of coal mines were made during this fiscal year (table 1).

b. 41,986 regular inspections of coal mines have been made since 1941, when Public Law 49 became effective (table 1).

c. 3,853 of the 5,283 active underground coal mines employing less than 25 men were inspected during the fiscal year, and the average number of inspections per small underground mine was 1.3 (table 2).

d. 1,944 of the 2,102 active underground coal mines employing 25 and more men were inspected during the fiscal year, and the average number of inspections per larger underground mine was 1.8 (table 2).

e. 563 of the 998 active strip mines were inspected during the fiscal year, and the average number of inspections per strip mine was 1.1 (table 2).

f. The average time required to inspect a mine and to prepare the inspection reports was 3.2 days, which included travel time (table 3).

It is believed essential that all small underground mines employing less than 25 men and all strip mines should be given a Federal inspection at least once a year and that all of the larger underground mines employing 25 and more men should be inspected at least twice a year. Based on the actual average time required to make a complete inspection of the different size mines and prepare the inspection reports (as indicated in table 3 of appendix E), the present allotted force of 250 Federal coal-mine inspectors is sufficient to maintain such a minimum inspection schedule provided that each inspector can devote full time to inspection work. However, Federal inspectors are required to perform special duties, such as investigating fatal accidents, making dust surveys, reviewing inspection reports, working in a supervisory capacity, working on rescue and recovery jobs, investigating coal-mine disasters, teaching the Bureau's accident-prevention classes, and various other jobs that are listed in appendix F of this report. Such special assignments are quite essential to comply with the provisions in Public Law 49 and to obtain the greatest benefits from the regular inspection work; but they reduce the man-days available for inspections and thus help prevent meeting the minimum inspection schedule.

SPECIAL WORK ACCOMPLISHED

Although the routine inspection of coal mines and the distribution of inspection reports are primary functions of personnel of the Branch, it is realized that the effectiveness of the inspections is enhanced when mine supervisory personnel and mine workmen have enough technologic and practical knowledge of modern concepts of coal-mine safety to recognize an unsafe condition or practice when it exists or is developing and know how to correct it. The opportunity to obtain such knowledge through the Bureau of Mines has not been available generally during the past years, principally because funds were not provided to allow the necessary training.

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The need for providing this opportunity is recognized in section 6 of Public Law 49, which authorizes and directs the Secretary of the Interior, acting through the Bureau of Mines, to expend the funds made available to him for protective or advancing health and safety in coal mines and for the preventing or relieving accidents and occupational diseases in mines, in such lawful manner as he may deem most effective in the light of the information obtained under this act to promote the accomplishment of the object for which such funds are granted.

To comply with such directive, the outstanding special work accomplished during this fiscal year is described below; the miscellaneous special work is included in Appendix F of this report.

Coal-Mine Accident-Prevention Course for Miners

The National Bituminous-Coal Wage Agreement provides that:

> At each mine there shall be a Mine Safety Committee selected by the local union. The Mine Safety Committee may inspect any mine development or equipment used in producing coal. If the Committee believes conditions found endanger the life and bodies of the mine workers, it shall report its findings and recommendations to management. In those special instances where the Committee believes an immediate danger exists and the Committee recommends that management remove all mine workers from the unsafe area, the operator is required to follow the recommendation of the Committee.

The Anthracite Wage Agreement provides that:

> Mine Committees, acting on request of individual employees or upon their own personal knowledge, shall have the right to report to management unsafe conditions affecting operations or equipment. In such cases the Mine Committee shall have the right, accompanied by representatives of management, to make necessary inspections of property or equipment for the ascertainment of actual facts. In the event such conditions, when reported, are not satisfactorily corrected, the Mine Committee shall request action by the State and Federal inspectors.

To assure that members of these committees would be well-versed in the provisions in the Federal Mine Safety Code for Bituminous-Coal and Lignite Mines and the Safety Standards for Anthracite Mines and thereby be better equipped to recognize unsafe conditions and practices that exist or are developing and to learn the proper means of overcoming them, the Bureau of Mines, in cooperation with the United Mine Workers of America, inaugurated a course of training for mine-safety committeemen in January 1947. The Coal-Mine Accident-Prevention Course for Miners covers the practical, and some technical, aspects of modern principles of coal-mine safety and requires 20 hours of classroom work. This course had such an enthusiastic endorsement by mine-safety committeemen and operators that it was decided to extend the enrollment opportunity to all mine workmen. That they have

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taken advantage of the opportunity to learn the fundamentals of mine safety is attested by the record of training. From the time the revised training program was started on January 1, 1947, to June 30, 1951, 34,832 mine-safety committeemen and miners had completed the course. Usually the classes are conducted by Federal coal-mine inspectors who have been especially trained and authorized to carry on instructional work.

Such an educational activity is most effective when all workmen at a particular mine participate; and the Bureau of Mines offers encouragement by awarding a 100-percent training certificate to each local union whose membership has completed the training. Since this procedure was adopted in June 1949, 16 such certificates have been issued.

Coal-Mine Accident-Prevention Course for Mine Supervisors

Congress appropriated enough funds to continue the employment of 22 mining engineers to train coal-mine supervisors in the modern principles of mine safety. The Coal-Mine Accident-Prevention Course for Mine Supervisors requires 40 hours of classroom instruction and covers all technologic as well as practical phases of safety as applied to surface facilities; timbering and roof control; the transportation, storage, and use of explosives; ventilation and mine gases; coal and rock dust; haulage; electricity; safeguarding equipment; fire prevention and control; and other miscellaneous items. The course includes lectures, class discussions, actual demonstrations, and the use of visual aids, such as motion pictures, slides, and blackboard sketches.

This training program has met marked success; and from March 1948, when the revised course was first offered, to June 30, 1951, 12,276 coal-mine supervisors and others aspiring to such positions completed the training. The Bureau also encourages 100-percent participation by supervisors, and offers 100-percent-training certificates to the mines where all supervisors have completed the training. Since this procedure was adopted in April 1949, 105 such certificates have been issued. It is estimated that 50,000 supervisors are employed in and around the Nation's coal mines.

Investigation of Fatal Coal-Mine Accidents

The Bureau of Mines has investigated major mine disasters since its inception in 1910 as part of its accident-prevention program, and the conclusions drawn from these investigations have been used as a basis for recommending measures to prevent recurrences. The Bureau also has investigated explosions and fires in which less than five or no lives were lost, but before 1950 it was not general practice to investigate fatalities resulting from occurrences other than mine fires or explosions. The Bureau has long recognized the need for a comprehensive study of fatal accidents, but the task was too great for the limited available personnel. Improvement in the rate at which fatalities are occurring in coal mines and the modest increases in inspection personnel provided by Congress in recent years have made possible Bureau investigations of all fatal accidents. On February 10, 1950, the Bureau embarked on a policy of having the Federal coal-mine inspectors investigate all fatal coal-mine accidents. Where such an accident is investigated by State inspection agencies, the Bureau desires its inspectors to cooperate with the State inspector in conducting the investigation.

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However, a separate report is prepared by the Federal inspector, and it is distributed to the same agencies and persons who ordinarily would receive copies of the regular coal-mine inspection report. The investigation report gives the facts of the accident, presents the inspector's conclusions regarding the cause, and includes appropriate recommendations for the prevention of similar occurrences in the future. The inspector does not attempt to fix responsibility for the accident, because this is a function of State law-enforcement agencies.

The information in the reports covering the investigation of coal-mine fatalities that occurred during the calendar year 1950 has been condensed and published in the form of Bureau of Mines information circulars. It will be particularly useful to officials of coal companies and of the mine workers' organizations in planning future accident-prevention programs; to safety instructors who must present material of personal interest so the cause of accidents will be well known to the class members, and so the means to prevent them will not be forgotten quickly; to safety directors, inspectors, and supervisors who need such information to carry out their duties better; and for discussion at meetings attended by those who are interested in coal-mine safety. The ultimate objective is to provide information that will be helpful in preventing accidents.

This is the first time in the history of coal mining that the Bureau of Mines or any other agency or person has assembled, on a Nation-wide basis, detailed reports on the investigation of all fatalities occurring in coal mines of the United States and Alaska. The published reports covering the first year's investigations by Federal coal-mine inspectors reveal the following:

1. Falls of roof, face, or rib caused 67 percent of all fatalities occurring underground at bituminous-coal and lignite mines. Human failure was determined to be responsible for 89 percent of the roof-fall fatalities investigated; a breakdown of human failures showed that management failure accounted for 48 percent of such fatalities, employee failure 29 percent, and joint or undetermined human failure 12 percent. Dangers that could not be foreseen and risks that were unavoidable accounted for 11 percent of the roof-fall fatalities.

2. Haulage accidents caused 27 percent of the total fatalities that occurred at bituminous-coal and lignite mines. Four states suffered 82 percent of such fatalities, and most of them were caused by falling or stumbling into the path of moving equipment, contact with roof or crossbars, derailments, collisions, and runaway equipment. The leading physical hazards were irregular or scant overhead clearance, substandard track conditions, lack of skids or other retarding devices for rolling stock, defective equipment, obstructed or inadequate clearance, and defective couplings. Major unsafe practices included riding in unsafe positions, getting on or off moving equipment, pushing trips, excessive speed, standing or walking in exposed conditions, and disregarding signals.

3. A study of all types of fatalities that occurred in the anthracite mines of Pennsylvania in 1950 revealed that management failure was responsible for 17 percent, employee failure 42 percent, and joint or undetermined human failure 12 percent. Unforeseen dangers accounted for 24 percent and unknown causes the remaining 5 percent.

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Roof-Control Work

Accident statistics have indicated for years that falls of roof and coal consistently causes more than half the fatalities that occur in coal mines, and this record has challenged all the forces interested in improving the accident rates in the coal-mining industry. The Bureau of Mines has done a considerable amount of research work with respect to mine-roof control when funds for it were available, but as late as 1948 no person or agency produced any new or improved means of solving the problems presented by this No. 1 killer of mine personnel. The Bureau has realized that, to reduce coal-mine injuries to a greater extent, it would be necessary to find better methods of roof control; the Bureau's efforts in that direction finally culminated in the general introduction to the coal-mining industry in 1948 of a new means of roof control known as roof bolting. The basic principal involved is to prevent the initial sag in exposed roof strata by converting the strata into a rigid beam with steel bolts set in holes drilled in the roof rock. These bolts must be secured as soon as the roof is exposed by the normal process of mining.

After enough experimental work was conducted to prove the practicability and safety of bolting under controlled conditions, the method was given wide publicity in Bureau of Mines publications and in the trade journals. To satisfy the demand of mine operators for the Bureau's suggestions for installing roof bolts and to assure that the method would not be condemned as a failure because of improper installations, the Bureau trained certain Federal coal-mine inspectors and engineers to qualify as expert consultants in roof bolting, and 13 such experts are now headquartered in coal-mining areas where their services are needed. Generally the mine operators obtain the advice and recommendations of the Bureau experts before any bolts are purchased, and some States now require mine operators to obtain a permit from the State inspection agency before roof bolting can be started. Such wise precautions have contributed much to the success of this new method of roof control.

Before roof bolting is adopted in any mine the Bureau of Mines recommends the following procedure:

Controlled experiments to determine whether roof bolting is applicable should be made in conformance with the procedures that have been worked out by the Bureau of Mines. Bureau experiments are made under controlled conditions with auxiliary conventional supports during the initial experimentation. After a safe and economical method of bolting is determined, no deviation from this method should be made without undergoing a new experimental period. Also, if roof conditions change radically from those encountered during the initial experimental period, a new experimental period should be undergone.

The attitude of mine operators toward roof bolting is described best by saying that, since 1948, when the method was generally introduced to the industry, roof bolts have been installed in 494 coal mines and 54 noncoal mines. They are used exclusively in a number of large mines; and, according to the records, when installed as recommended by the Bureau of Mines, roof bolts simply and effectively prevent falls of roof. The installations have not been made in enough mines to have a notable effect on the accident rates in the entire coal-mining industry, but the success attained at mines where

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they are being used indicates what may be expected as their use becomes more general.

The introduction of roof bolting to the coal-mining industry marks another major contribution of the Bureau of Mines in its efforts to fulfill the primary objective of the Congress in establishing the Bureau in 1910 - to prevent accidents in the mineral industries.

As a further means of reducing the incidence of roof-fall accidents, the Bureau of Mines initiated, in May 1951, a Roof-Fall Accident-Prevention Training Program. The course will consist of about 2 hours of lecture and discussion, and will be presented to coal-mine officials and employees by Federal coal-mine inspectors - generally at the completion of the inspection of a mine. The course is designed to impress upon mine personnel the need for more adequate roof-control measures and to make all concerned more roof conscious.

The course of training will be introduced to the industry in July 1951, and diligent efforts will be made to present it to the largest possible number of men who are exposed to falls of roof, face, or rib.

Coal-Mine Haulage-Safety Section

The Haulage-Safety Section of the Coal-Mine-Inspection Branch was established in December 1950 to reduce haulage accidents in coal mines by a study of causes; to further study the trend of modernization and its possible effect on safety records; to establish job-safety-training instruction for haulage employees, based upon haulage safety fundamentals and accident experiences; to conduct haulage-hazard surveys by trained personnel, and to promote a safety campaign to reach all persons connected with coal-mine transportation.

During the second half of this fiscal year the following accomplishments were realized through activities of this Section:

Information Circular 7604, Analysis of Haulage Fatalities in Bituminous Coal Mines, 1950, was prepared and published.

Preliminary studies and essays for the following proposed short movies depicting safe haulage practices were completed:

1. Coal-mine transportation.
2. Safe haulage roads.
3. Safe operation of shuttle cars and conveyors.
4. Safety practices for nonhaulage employees.

Shooting of the motion-picture film entitled "Coal-Mine Transportation" was initiated.

The text material and outline for job-safety training of haulage employees was prepared and was introduced to the industry in April 1951 in southern West Virginia, Virginia, Kentucky, Tennessee, Alabama, Indiana, and Illinois.

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A total of 257 training classes at mines was conducted, and 8,538 letter certificates were issued to officials, haulage employees, mine-safety committeemen, and nonhaulage employees up to June 30, 1951.

The Bureau of Mines was represented at meetings of the subcommittee for the revision of transportation standards, American Standards Association, and technical information on haulage was assembled and compiled for use by the committee.

Technical papers on coal-mine haulage safety were prepared and presented at coal-mining institutes.

Information pertaining to haulage-accident occurrence and safe practices as well as technical data were furnished to numerous companies and organizations requesting such information.

Injury and Employment Data

One of the special duties of coal-mine inspectors and engineers of the branch is to enlist the cooperation of coal-mine operators in submitting to the Bureau of Mines reports on injury and employment statistics. If an operator needs instruction on how to fill out the proper forms, the inspector or engineer is prepared to give the advice needed. This work is done at the time the mine is being inspected, and has resulted in the submission of more and better reports by mine operators.

Ventilation Surveys

One mining engineer of the Coal-Mine-Inspection Branch is assigned to devote full time to coal-mine ventilation studies, surveys, and research. Especially difficult ventilation problems are encountered in mines from time to time, and mine operators request the Bureau's assistance in solving them. Generally these studies require pressure surveys and technical calculations that the regular coal-mine inspectors are not equipped to make.

Explosives Surveys

Mining-explosives engineers of the Branch conducted special investigations with respect to the storage, transportation, and use of explosives and blasting devices during the year. Generally, such studies are made at the request of mine operators who are interested in improving the safety and economy of their operations.

The Bureau of Mines has advocated the exclusive use of permissible explosives or permissible blasting devices in coal mines for many years, and had advised against the use of black blasting powder and dynamite, which have caused so many gas and dust explosions with attendant heavy casualties. The mining-explosives engineers did a considerable amount of educational work, demonstrating to mine operators by performance tests in the mines that the use of permissible explosives is much safer and as economical as black blasting powder. Through their efforts and the efforts of the regular coal-mine inspectors, the use of dangerous black blasting powder was discontinued in 192 coal mines during this fiscal year.

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Miscellaneous work by the mining-explosives engineers is recorded in Appendix F of this report.

Electrical Surveys

The mining-electrical engineers of the Branch conducted special technical investigations of electrical facilities and installations in coal mines, generally at the request of mine operators. The engineers also were assigned to cooperate with the industry in conducting research work on electrical apparatus with a view toward designing safer equipment. The miscellaneous activities of the mining-electrical engineers are included in appendix F of this report.

Dust Surveys

During the period January 21-31, 1946, a course of instruction in the Determination and Control of Unhygienic Dusts was given by personnel of the Bureau's Health Branch to 20 employees of the Safety and Coal-Mine-Inspection Branches. The object of the training was to provide each main field station with a qualified man to determine the concentration of air-borne dusts in coal mines and to cooperate with dust experts of the Health and Safety Branch in conducting such surveys.

The importance of dust control in coal mines is recognized by the mining industry, and the Bureau of Mines is continuing its research work on mine dusts with the view toward collecting enough data to be used as a basis for determining the concentrations of certain dusts that are considered harmful from a health standpoint and to determine the method and type of facilities best-suited for controlling dusts.

The Bureau's reports on dust surveys are becoming more important because of the great increase in rock drilling in coal mines. In promoting the adoption of roof bolting, the Bureau has been aware of the health hazard introduced by drilling holes in silica-bearing formations. The industry was urged to take the necessary precautions to overcome this health hazard and has been active in cooperating with the manufactures of mining equipment in designing and developing suitable dust collectors for this purpose. In keeping with Bureau policy to see that proper equipment is available to the industry, a schedule for testing dust collectors at the Bureau's Central Experiment Station has been completed and will be published in the near future.

Federal Coal-Mine Inspectors Loaned to other Agencies

Cooperation with other Federal agencies included the following assignments of personnel of the Coal-Mine-Inspection Branch to special foreign duty during this fiscal year:

1. One coal-mine inspector was loaned to the Department of the Army in August 1949 to assist in the fuel program in Korea. This assignment was completed in February 1951.

2. One mining engineer was assigned to the Economic Cooperation Administration in May 1949 to serve as advisor to the Turkish Government in developing coal mines. This mission is still being carried on.

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Such assignments of engineers and inspectors serve a twofold purpose: (1) The agency to which the Bureau experts are loaned receives the benefit of their wide experience in mining and the experts add to their fund of knowledge, and (2) the information obtained through such special work is made available to the mining industry if such action is deemed in the public interest.

Revision of State Coal Mining Laws

Since 1947 personnel of the Coal-Mine-Inspection Branch has assisted in preparing proposed revisions of the coal-mining laws of 12 States.

The safety-regulations section of the proposed revisions was designed along the lines of the Federal Mine Safety Code, thus assuring more modern and standardized State coal-mining laws, and they have been adopted in Alabama, Colorado, Maryland, Montana, Tennessee, and Wyoming. Proposed revisions of such laws for Arkansas, Illinois, Indiana, Kentucky, Ohio, and Oklahoma were prepared, but either they were not enacted or were not introduced in the legislature.

Three of the four proposals prepared in 1950 to be considered at the 1951 sessions of the various legislatures were enacted into law substantially as written. The Bureau of Mines will continue to furnish this service to any agencies directly concerned with improving State mining laws, such as labor organizations, coal-operators' associations, and State officials.

This contribution toward the reduction of injuries in coal mines is another major and vitally important step taken by the Bureau to fulfill its obligations to the coal-mining industry.

PUBLICATIONS

The following Bureau of Mines publications, issued during the fiscal year 1951, were prepared by personnel of the Coal-Mine-Inspection Branch:

Publication	Title	Authors
Inf. Circ. 7603	Ventilation Methods and Safety Measures Used in the Temporary Ventilation of the King Solomon Tunnel, Frisco, Summit County, Colo.	G. B. Fritts R. L. Bolmer
Inf. Circ. 7604	Analysis of Haulage Fatalities in Bituminous-Coal Mines in 1950.	M. J. Ankeny D. S. Kingery
Inf. Circ. 7605	Falls of Roof: The No. 1 Killer in Bituminous-Coal Mines.	J. J. Forbes T. L. Back H. F. Weaver
Inf. Circ. 7609	Why Men Were Killed in Anthracite Mines of Pennsylvania in 1950.	J. J. Forbes H. F. Weaver

Personnel of the Coal-Mine-Inspection Branch prepared numerous papers on all phases of coal-mine safety for presentation at safety institutes and safety meetings. A record of such special work is included in appendix F of this report.

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APPENDIXES

Appendix A

Personnel of the Coal-Mine-Inspection Branch Employed, as of June 30, 1951, and Coal Area Covered by Each Field Unit

Region I

S. H. Lorain, regional director
Anchorage, Alaska

Ludlow G. Anderson, engineer-in-charge
Anchorage, Alaska

Coal area covered - Territory of Alaska

Francis G. Graham	Clerk-stenographer	Anchorage, Alaska

Region II

S. M. Shelton, regional director
Albany, Oreg.

Louis H. McGuire, division chief
Seattle, Wash.

Coal area covered - Washington, Oregon, Idaho, and Montana

E. L. Christensen	Coal-mine inspector	Billings, Mont.
T. R. Mark, Jr.	do.	Do.
Dee Zimmerman	do.	Seattle, Wash.
Ruth G. Johnson	Clerk-Typist	Do.

Region IV

John H. East, Jr., regional director
E. H. Denny, division chief

A. C. Moschetti, section supervisor
Denver, Colo.

Coal area covered - Colorado, New Mexico (except coal mines on Indian land), and Wyoming (counties of Carbon, Converse, Campbell, Johnson, Natrona, and Sheridan)

J. E. Bailey	Coal-mine inspector	Denver, Colo.
J. J. Bastalich, Jr.	do.	Do.
Arthur Charlesworth	do.	Do.
R. E. Evans	do.	Do.
J. Freeman	do.	Do.
G. B. Fritts	do.	Do.
C. T. Hallett	do.	Do.

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Region IV (Cont.)

D. R. Ratkovich	Coal-mine inspector	Denver, Colo.
R. T. Reay	do.	Do.
H. W. Russell	do.	Do.
P. C. Van Natter	do.	Do.
Luella A. Carr	Clerk-typist	Do.
Margaret M. Olsen	Clerk-stenographer	Do.
Alice I. Ward	Clerk	Do.
Jeanne M. Wildy	Clerk-typist	Do.

R. D. Reeder, section chief
Salt Lake City, Utah

Coal area covered - Utah and Wyoming (Fremont, Hot Springs, Lincoln, Sublette, Sweetwater, Teton, and Uinta Counties)

Ezekiel B. Confer	Health and safety engineer	Rock Springs, Wyo.
Andrew J. Kopp	Coal-mine inspector	Salt Lake City, Utah
Thomas H. O'Neal	do.	Do.
William M. Merritts	Health and safety mining engineer	Do.
Thomas T. Reay, Jr.	Coal-mine inspector	Price, Utah
William Roberts	do.	Rock Springs, Wyo.
Iona R. Ayre	Clerk-stenographer	Salt Lake City, Utah
Afton Speakman	Clerk-typist	Do.

Allen D. Look, section chief
Phoenix, Ariz.

Coal area covered - Arizona and Navajo and Zuni Indian Reservations in New Mexico

Region V

Paul Zinner, regional director
Minneapolis, Minn.

John A. Johnson, division chief
Duluth, Minn.

Coal area covered - North Dakota, Iowa, and Michigan

Roy Capps	Coal-mine inspector	Duluth, Minn.
Walter B. Dalrymple	Mining engineer	Ames, Iowa
Irene N. Porvaznik	Clerk-stenographer	Duluth, Minn.
Jacqueline E. Satt	do.	Do.

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Region VI

C. W. Seibel, regional director
Amarillo, Tex.

George M. Kintz, division chief
Dallas, Tex.

Robert D. Bradford, branch chief
McAlester, Okla.

Coal area covered - Oklahoma, Arkansas, Missouri, Kansas, and Texas.

M. T. Fuller	Coal-mine inspector	McAlester, Okla.
Louis S. Kovash	do.	Do.
Eugene W. Machin	do.	Do.
Arthur A. Sinicrope	do.	Do.
Paul Willis	do.	Do.
Charlie E. Thomas	Instrument maker	Do.
Mignonette W. Grantham	Clerk-typist	Do.
Mary Romano	Clerk-stenographer	Do.

Region VII

Hewitt Wilson, regional director
Norris, Tenn.

Milton C. McCall, division chief
Birmingham, Ala.

Coal area covered - Alabama, Georgia, and North Carolina

William Arthur	Coal-mine inspector	Birmingham, Ala.
Donald Bowker	do.	Do.
Thomas F. Curry	do.	Do.
Arthur Guthrie	do.	Do.
L. H. Harrison	Mining electrical eng.	Do.
Carl F. Kahre	Coal-mine inspector	Do.
H. J. K. Marstrander	do.	Do.
Wilbur G. McCreary	do.	Do.
Frederick V. Rankin	do.	Do.
Joe A. Rejonis	do.	Do.
Martin F. Sedlock	do.	Do.
Harry N. Smith	do.	Do.
Harry C. Young	do.	Do.
Frances B. Laney	Clerk-typist	Do.
Catherine W. Ray	Clerk	Do.
Mary G. Stevens	Clerk-typist	Do.
Willette B. Tennent	do.	Do.

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Charles H. Dodge, branch chief
Jellico, Tenn.

Coal area covered - Tennessee

Ira Amburgey	Coal-mine inspector	Jellico, Tenn.
James E. Biggs	do.	Do.
Stephen J. Bukovitz	do.	Do.
Herbert D. Gouk	do.	Do.
Fornie A. Jordan	do.	Do.
Joseph Neal	do.	Do.
Jack Reese	do.	Do.
Peter F. Stevenson	do.	Do.
Wilbur E. Stiles	do.	Do.
Fred W. Stout	do.	Do.
G. McKinley Braden	Safety representative	Do.
Nona P. Steely	Clerk-typist	Do.
Lois G. Trammel	Typist	Do.
Gladys M. Warming	Clerk-typist	Do.

Region VIII

H. P. Greenwald, regional director
James Westfield, Jr., division chief

W. D. Walker, Jr., branch chief
Pittsburgh, Pa.

Coal area covered - Pennsylvania (Allegheny, Armstrong, Beaver, Butler, Clarion, Fayette, Greene, Lawrence, Mercer, Venango, Washington, and Westmoreland Counties)

John E. Bradburn	Coal-mine inspector	Pittsburgh, Pa.
Clyde L. Brown	Mining engineer (elec.)	Do.
Harry R. Burdelsky	Coal-mine inspector	Do.
Gordon W. Chastain	do.	Waynesburg, Pa.
Wymar G. Cooper	do.	Pittsburgh, Pa.
Robert T. Davis	do.	Do.
Delbert D. Dornenburg	Mining engineer (coal)	Do.
Junior H. Dumire	Coal-mine inspector	Do.
Edward C. Dydo	do.	Greensburg, Pa.
Roy C. Estep	do.	Kittanning, Pa.
Thomas J. Forbes	Electrical engineer	Pittsburgh, Pa.
Frank Heffers	Coal-mine inspector	Washington, Pa.
John W. Holcomb	do.	Pittsburgh, Pa.
Lawrence S. Johnston	do.	Uniontown, Pa.
Charles M. Keenan	do.	Pittsburgh, Pa.
Kenneth K. Kelley	do.	Do.
Griffin L. Lynch	do.	Do.
William L. Lyons	do.	Uniontown, Pa.
Alexander E. Morrow	do.	Pittsburgh, Pa.
David T. Parry	do.	Kittanning, Pa.
Samuel P. Polack	Mining engineer (coal)	Pittsburgh, Pa.
John Risko	Coal-mine inspector	Do.

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Milton J. Satterfield	Coal-mine inspector	Pittsburgh, Pa.
George M. Smith	do.	Do.
Glenn J. R. Toothman	Mining health and safety engineer	Do.
Samuel J. Wills	Coal-mine inspector	Do.
Michael A. Yuhase	do.	Waynesburg, Pa.
Frances A. Begg	Clerk-typist	Pittsburgh, Pa.
Virginia A. Graham	Clerk-stenographer	Do.
Agnes M. Hedfield	Clerk-typist	Do.
Martha E. Hanulik	Clerk-stenographer	Do.
Hilda K. Krumm	do.	Do.
Margaret Lang	Clerk-typist	Do.
Rose Silver	Clerk	Do.
Jean R. Vogel	Clerk-stenographer	Do.
Shirley J. Yanosko	do.	Do.
Margaret C. Zahradnik	do.	Do.

Edward H. McCleary, branch chief
Wilkes-Barre, Pa.

Coal area covered - Pennsylvania anthracite region

Nicholas M. Benson	Coal-mine inspector	Wilkes-Barre, Pa.
William J. Buswink	do.	Do.
Lee B. Carson	do.	Do.
Gerald W. Croyle	do.	Do.
George W. Culverhouse	do.	Do.
Theodore F. Deak	do.	Do.
Gerald W. Fortney	do.	Do.
John A. Fulmer	do.	Do.
Andrew Hamilton	do.	Do.
David M. Hart	do.	Do.
Michael J. Hovanec	do.	Do.
Charles E. Jones	do.	Do.
Frank A. Kosa	do.	Do.
James R. Laird	do.	Do.
Harvey P. Landis	do.	Do.
Joseph R. Lindsey	do.	Do.
Joseph V. Mather	Mining engineer	Do.
Garrett M. Mortensen	Coal-mine inspector	Do.
Joseph L. Plisko	do.	Do.
Frank A. Retsel	do.	Do.
H. A. Schrecengost	do.	Do.
Clair S. Sigworth	do.	Do.
Joseph E. Stanton	do.	Do.
Edmund P. Thomas	do.	Do.
R. G. Todd	do.	Do.
William T. Torrance	do.	Do.
Chas. F. Weber	do.	Do.
H. F. Wilson	do.	Do.
Pauline Bankovich	Clerk-stenographer	Do.
Betty M. Bennett	Clerk	Do.

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Wilkes-Barre, Pa. (Cont.)

Ruth A. Ginley	Clerk-stenographer	Wilkes-Barre, Pa.
Helen N. Hurd	do.	Do.
Martha A. Karweta	Clerk-typist	Do.
Bridget H. Lipp	do.	Do.
Lillian Levandoski	do.	Do.
Catherine Moskwa	Clerk-stenographer	Do.
Josephine Sgro	Clerk-typist	Do.

E. E. Quenon, branch chief
Mount Hope, W. Va.

Coal area covered - West Virginia (South Jackson, Roane, Braxton, Webster, and Randolph Counties)

Daniel R. Baileys	Coal-mine inspector	Welch, W. Va.
Walter L. Beene	do.	Mount Hope, W. Va.
Jess H. Blanton	do.	Do.
James G. Bosley	do.	Logan, W. Va.
Eric H. Brown	do.	Mount Hope, W. Va.
Robert C. Calvert	do.	Do.
Raymond C. DeWeese	do.	Montgomery, W. Va.
Raymond L. Ellis	do.	Do.
Joseph S. Ferraro	do.	Mount Hope, W. Va.
Frank J. Furin	do.	Do.
Thomas W. Gay	do.	Logan, W. Va.
William E. Gaylor	do.	Welch, W. Va.
James L. Gilley	do.	Do.
Emmanuel J. Grillos	do.	Mount Hope, W. Va.
James F. Haley	do.	Montgomery, W. Va.
Marvin E. Hall	do.	Mount Hope, W. Va.
Oscar W. Harris	do.	Logan, W. Va.
Thomas C. Higgins	do.	Welch, W. Va.
Harold M. Hock	do.	Mount Hope, W. Va.
Carl A. Kansala	do.	Do.
Earl M. Klees	do.	Beckley, W. Va.
Luther A. Lewallen	do.	Mount Hope, W. Va.
Hobart B. Lynch	do.	Logan, W. Va.
Denis C. McGinity	do.	Welch, W. Va.
John Matsko	do.	Mount Hope, W. Va.
James A. Merrick	do.	Montgomery, W. Va.
Leo M. Morelli	do.	Summersville, W. Va.
John C. Muir	do.	Logan, W. Va.
George Noe	do.	Welch, W. Va.
George M. Reid	do.	Mount Hope, W. Va.
William T. Trinkley	do.	East Rainelle, W. Va.
Lex Trunko	do.	Logan, W. Va.
Arthur L. Ulshafer	do.	Pineville, W. Va.
Jesse A. Van Gilder	do.	Montgomery, W. Va.
Ward R. Vickers	do.	Welch, W. Va.
James T. Whalen	do.	Logan, W. Va.
James H. Winning	do.	Montgomery, W. Va.
Lawrence L. Wylam	do.	Princeton, W. Va.
John Zeleskey	do.	Welch, W. Va.

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Mount Hope, W. Va. (Cont.)

Lloyd G. Fitzgerald	Mining engineer	Mount Hope, W. Va.
Edward M. Lewis	do.	Bluefield, W. Va.
Doris J. Bailey	Clerk-stenographer	Mount Hope, W. Va.
Gladys C. Davis	Clerk-typist	Do.
Frances Dixon	Clerk (typing)	Do.
Bertha J. Johnson	Clerk-typist	Do.
Margaret L. McCool	do.	Do.
Anne Mandich	do.	Do.
Montana M. Perry	Clerk-stenographer	Do.
Helen V. Pomykata	Clerk-typist	Do.
Audrey O. Sanger	do.	Do.
Pasquale Pino	Packer-janitor	Do.

James B. Benson, acting branch chief
Norton, Va.

Coal area covered - Virginia and Kentucky (east of Frankfort)

Leslie E. Allen	Coal-mine inspector	Norton, Va.
George M. Betchey	do.	Big Stone Gap, Va.
Henry Bickelman	do.	Norton, Va.
Wm. F. Boyle	do.	Do.
Houston C. Brumbaugh	do.	Do.
Patrick J. Buchanan	do.	Do.
Clyde W. Casey	do.	Pikeville, Ky.
John H. Clawson	do.	Norton, Va.
Robert L. Cochran	do.	Big Stone Gap, Va.
Francis A. Gress	do.	Norton, Va.
Malcolm L. Davis	do.	Do.
Wm. L. Demkowicz	do.	Do.
Matthew I. Duncan	do.	Pikeville, Ky.
John G. Emershaw	do.	Norton, Va.
John W. Griffin	do.	Big Stone Gap, Va.
Raymond T. Linville	do.	Do.
Joseph S. Melesky	Mining engineer	Norton, Va.
Wm. L. Meadows	Coal-mine inspector	Pikeville, Ky.
George L. Mears	do.	Norton, Va.
George W. Parry	Mining engineer	Do.
Wm. J. Phillips	Coal-mine inspector	Do.
Russell Shaw	do.	Prestonsburg, Ky.
Oscar V. Simpson	do.	Big Stone Gap, Va.
Wm. R. Stewart	do.	Norton, Va.
DeJack Vittitow	Roof-control specialist	Do.
Harold H. Wiley	Coal-mine inspector	Do.
John F. Wilson	do.	Do.
Joseph B. Yanity	do.	Do.
Lundis C. Clark	Clerk-typist	Norton, Va.
Betty S. Gilliam	do.	Do.
Billy W. Greene	Packer-janitor	Do.
Clara L. Keith	do.	Do.
Georgia L. Litton	do.	Do.
Leonora P. Litton	do.	Do.
Betty J. Pappas	do.	Do.
Pat B. Robinson	do.	Do.
Martha C. Smith	Clerk-stenographer	Do.

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William B. Park, section chief
Barbourville, Ky.

Coal area covered - included in Norton, Va., area.

Nestor L. Adams	Coal-mine inspector	Hazard, Ky.
Durrell W. Barger	do.	Barbourville, Ky.
Brooks Blackwood	do.	Do.
James W. Cromwell	do.	Hazard, Ky.
Jay Dee Farris	do.	Barbourville, Ky.
Newton M. Henson	do.	Do.
Clarence E. Hyde	do.	Do.
John E. Jones	do.	Hazard, Ky.
Richard Lloyd	do.	Barbourville, Ky.
Kathryn M. Barger	Clerk-typist	Do.
Lucille Washburn	do.	Do.

H. E. Sanford, section chief
Johnstown, Pa.

Coal area covered - Pennsylvania (Bedford, Blair, Cambria, Clearfield, Centre, Clinton, Elk, Huntington, Indiana, Jefferson, Lycoming, Somerset, and Tioga Counties)

S. A. Andrejko, Jr.	Coal-mine inspector	Johnstown, Pa.
H. E. Basinger	do.	Do.
P. J. Beatty	do.	Philipsburg, Pa.
D. L. Brown, Jr.	do.	Johnstown, Pa.
W. D. Brown	do.	Indiana, Pa.
W. C. Cagley	do.	Johnstown, Pa.
C. J. Dalzell	do.	Do.
J. J. Dougherty	Mining engineer	Do.
Omar Elkins	Coal-mine inspector	Do.
L. A. Perry	do.	Philipsburg, Pa.
M. J. Hughes, Jr.	do.	DuBois, Pa.
A. C. Jones	do.	Johnstown, Pa.
D. K. Kreischer	do.	Barnesboro, Pa.
S. A. Magistrella	do.	Indiana, Pa.
R. L. McChain	do.	Ebensburg, Pa.
J. A. Moore	do.	Johnstown, Pa.
V. D. Null	do.	Do.
T. B. Powell	do.	Somerset, Pa.
W. Rachunis	do.	Ebensburg, Pa.
H. L. Scott	do.	Punxsutawney, Pa.
Rosella Bevc	Clerk-stenographer	Johnstown, Pa.
J. B. Franke	do.	Do.
R. M. Kessler	do.	Do.
E. L. Spielman	do.	Do.
G. M. Stahl	Clerk-typist	Do.
V. M. Weakland	Chief clerk	Do.

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S. T. Reese, section chief
Fairmont, W. Va.

Coal area covered - Maryland and West Virginia (north of Mason, Kanawha, Clay, Nicholas, and Pocahontas Counties and South of Marshall County)

Delbert F. Baker	Coal-mine inspector	Fairmont, W. Va.
William D. Baldwin	do.	Do.
Jay C. Davis	do.	Do.
Joseph J. Dobis	do.	Do.
William C. Eiduke	do.	Do.
Warden L. Evans	do.	Do.
Harry Jones	do.	Frostburg, Md.
Fred E. Kemrite	do.	Elkins, W. Va.
Thomas J. McDonald	do.	Fairmont, W. Va.
William R. Melville	do.	Do.
Arthur Metcalf	do.	Do.
Joseph F. Orlando	do.	Do.
Frank E. Riley	do.	Do.
Paul M. Shay	do.	Grafton, W. Va.
Thomas J. Ward	do.	Fairmont, W. Va.
Pauline B. Buretz	Clerk	Do.
Laura S. Cutlip	Clerk-typist	Do.
Mary K. Elsey	Clerk	Do.
Teresa M. Jones	do.	Do.
Hazel M. Shafer	do.	Do.

Monroe J. Mechling, section chief
St. Clairsville, Ohio

Coal area covered - Ohio and West Virginia (Brooke, Hancock, Marshall, and Ohio Counties)

John T. Callahan	Coal-mine inspector	St. Clairsville, Ohio
John S. Eakins	do.	Do.
Peter P. Hino	do.	Do.
Frank E. Hughes	do.	Athens, Ohio
Taylor V. Johns	do.	St. Clairsville, Ohio
Robert J. Kirk	do.	Do.
Edward J. Marron	do.	Do.
Joseph C. Roardon	do.	Cambridge, Ohio
William J. Symons	do.	St. Clairsville, Ohio
Elsa M. Cara	Clerk-stenographer	Do.
Mary E. Duffey	do.	Do.
Mary R. Travis	Clerk-typist	Do.
Kathryn Torges	do.	Do.

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W. H. Tomlinson, branch chief
Vincennes, Ind.

Coal area covered - Illinois, Indiana, and Kentucky (west of Frankfort)

Brank Beck	Coal-mine inspector	Springfield, Ill.
Loren A. Belt	do.	Madisonville, Ky.
William R. Chick	do.	Benton, Ill.
George W. Colbert	do.	Vincennes, Ind.
Clement M. Dovidas	do.	Do.
Clifton H. Dupree	do.	Madisonville, Ky.
William G. Fields	Coal-mine inspector	Peoria, Ill.
Francis J. Gallagher	Mining engineer (elec.)	Vincennes, Ind.
George W. Hammons	Coal-mine inspector	Staunton, Ill.
Moroni V. Hansen	Mining engineer	Vincennes, Ind.
Leon W. Kelly	Coal-mine inspector	Do.
Walter W. Kessler	do.	Staunton, Ill.
Frank Kolisek	do.	Benton, Ill.
James A. McCune	do.	Vincennes, Ind.
James A. O'Connor	do.	Do.
Frank Perz	do.	Terre Haute, Ind.
T. Alvin Scully	do.	Belleville, Ill.
Roy E. Seiger	do.	Terre Haute, Ind.
James P. Sheridan	do.	Vincennes, Ind.
Francis J. Smith	do.	Do.
Coy L. South	do.	Benton, Ill.
Joseph R. Summary	do.	Do.
Richard W. Whittaker	do.	Vincennes, Ind.
Irene W. Adams	Clerk-stenographer	Do.
Jo Ann J. Brown	Clerk-typist	Do.
Wilma H. Chester	do.	Do.
Clara Marie Dreiman	do.	Do.
Anna C. Kaiser	Clerk-stenographer	Do.
Lucile H. Martin	do.	Do.
Mary E. Meyer	Clerk	Do.
Leonard W. Pieper	Clerk-typist	Do.
Ethel A. Sampson	Clerk-stenographer	Do.
Georgia L. Van Lieu	Clerk-administrative assistant	Do.

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BUREAU OF MINES

James Boyd, Director

HEALTH AND SAFETY DIVISION

J. J. Forbes, chief
W. J. Fene, assistant chief

Office of the division chief

Hiram B. Humphrey	Mining engineer
Anna P. Brown	Administrative assistant
Mary E. Marion	Secretary (typing)
Nan E. Golden	Do.
Margaret Ann Bobby	Clerk-stenographer
Margaret A. Bartkovich	Do.

COAL-MINE-INSPECTION BRANCH

M. J. Ankeny, chief

H. F. Weaver, assistant chief

Donald S. Kingery	Chief, Coal-Mine Haulage-Safety Section
Raymon K. Franklin	Mining engineer
Paul R. Moyer	Do.
Robert V. Kelley	Do.
Troy L. Back	Mine-safety representative
Perna A. Zott	Clerk
Elizabeth D. Somers	Secretary (stenography)
Martha E. Patton	File clerk (typing)
Ruth M. Cohee	Clerk-typist

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Appendix B

Data pertaining to serious hazards in coal mines, fiscal year ended June 30, 1951

State	Total inspections made	Inspection reports indicating serious hazards		Letters regarding serious hazards		
				Sent to company presidents by chief of Health and Safety Division	Replies received	
		Number	Percent		Number	Percent of total sent
Alabama	610	433	71	433	19	4
Alaska	0	-	-	0	-	-
Arizona	5	1	20	1	0	0
Arkansas	61	57	93	57	4	7
Colorado	362	95	26	95	13	14
Georgia	4	4	100	4	0	0
Idaho	-	-	-	-	-	-
Illinois	409	298	73	298	35	12
Indiana	193	137	71	137	13	9
Iowa	54	23	43	23	1	4
Kansas	16	10	63	10	0	0
Kentucky	1,523	1,233	81	1,233	83	7
Maryland	49	5	10	5	1	20
Michigan	1	1	100	1	0	0
Missouri	73	49	67	49	1	2
Montana	94	43	46	43	10	23
New Mexico	93	12	13	12	3	25
North Carolina	2	2	100	2	1	50
North Dakota	13	1	8	1	0	0
Ohio	410	325	79	325	20	6
Oklahoma	49	41	84	41	4	10
Oregon	5	0	0	0	-	-
Pennsylvania (Anth.)	839	102	12	102	8	8
Pennsylvania (Bit.)	1,378	405	29	405	83	20
Tennessee	466	397	85	397	17	4
Texas	0	-	-	0	-	-
Utah	149	53	36	53	14	26
Virginia	330	261	79	261	33	13
Washington	37	15	41	15	1	7
West Virginia	1,651	345	21	345	102	30
Wyoming	95	32	34	32	8	25
National ave.	8,971	4,380	49	4,380	474	11

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Appendix C

TABLE 1. - Number of fatal and nonfatal injuries and injuries per million man-hours exposure, portal to portal, in coal mines of the United States

Calendar year	Fatal injuries						Nonfatal injuries					
	Bituminous		Anthracite		Total		Bituminous		Anthracite		Total	
	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate	Number	Rate
1933	833	1.31	231	1.49	1,064	1.34	43,946	68.87	15,183	98.13	59,129	74.58
1934	958	1.41	268	1.50	1,226	1.43	46,982	69.39	18,577	104.15	65,559	76.63
1935	968	1.46	274	1.78	1,242	1.52	47,529	71.47	15,897	103.16	63,426	77.43
1936	1,098	1.43	244	1.56	1,342	1.45	50,514	65.62	17,026	108.80	67,540	72.91
1937	1,198	1.54	215	1.58	1,413	1.55	52,847	68.05	13,412	98.72	66,259	72.62
1938	880	1.52	225	1.94	1,105	1.59	36,794	63.47	12,842	110.85	49,636	71.36
1939	867	1.36	211	1.71	1,078	1.42	38,544	60.52	13,229	107.37	51,773	68.12
1940	1,204	1.68	184	1.50	1,388	1.65	43,994	61.28	13,782	112.55	57,776	68.75
1941	1,072	1.35	194	1.49	1,266	1.37	46,637	58.93	14,420	110.83	61,057	66.26
1942	1,245	1.41	226	1.64	1,471	1.44	53,193	60.21	13,581	98.73	66,774	65.40
1943	1,225	1.39	226	1.50	1,451	1.40	51,067	57.79	13,527	89.68	64,594	62.44
1944	1,124	1.23	174	1.06	1,298	1.20	51,253	56.02	12,438	76.05	63,691	59.06
1945	925	1.13	143	1.01	1,068	1.11	46,194	56.52	10,923	77.32	57,117	59.58
1946	795	1.09	173	1.14	968	1.10	42,817	58.81	12,533	82.65	55,350	62.93
1947	985	1.23	173	1.18	1,158	1.22	46,025	57.32	11,635	79.41	57,660	60.72
1948	862	1.15	137	.91	999	1.11	42,078	56.28	11,394	75.69	53,472	59.53
1949[1]	500	.92	93	.85	593	.91	29,585	54.66	8,180	75.18	37,765	58.10
1950[1]	550	.93	92	.75	642	.90	28,380	47.83	8,855	71.72	37,235	51.94
1951 (6 months)[1]	296	.93	55	1.04	351	.95	(2)	(2)	(2)	(2)	(2)	(2)

1/ Preliminary data subject to revision.
2/ Data not available.

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Appendix D

Number of coal mines operated in the United States fiscal year ended June 30, 1951

State	Underground mines employing:						Strip mines	Total mines
	1-24	25-99	100-299	300-499	500 plus	Total underground		
Alabama	350	25	25	6	7	413	23	436
Alaska	4	1	1	0	0	6	4	10
Arizona	6	0	0	0	0	6	0	6
Arkansas	45	8	7	0	0	60	12	72
Colorado	174	27	10	0	1	212	6	218
Georgia	4	0	0	0	0	4	0	4
Idaho	0	0	0	0	0	0	0	0
Illinois	102	58	30	12	17	219	57	276
Indiana	58	6	10	8	1	83	50	133
Iowa	61	11	0	0	0	72	48	120
Kansas	20	3	0	0	0	23	22	45
Kentucky	1,508	199	124	26	12	1,869	37	1,906
Maryland	38	6	0	0	0	44	3	47
Michigan	0	1	0	0	0	1	0	1
Missouri	42	14	0	0	0	56	41	97
Montana	72	3	2	0	0	77	30	107
New Mexico	48	5	1	1	0	55	1	56
No. Carolina	0	1	0	0	0	1	0	1
No. Dakota	15	0	1	0	0	16	40	56
Ohio	280	37	11	5	7	340	63	403
Oklahoma	56	4	3	1	0	64	28	92
Oregon	3	0	0	0	0	3	0	3
Pennsylvania (Anth.)	199	59	58	26	39	381	148	529
Pennsylvania (Bit.)	540	184	95	26	43	888	184	1,072
Tennessee	457	29	19	2	0	507	28	535
Texas	1	0	0	0	0	1	1	2
Utah	51	5	5	3	3	67	0	67
Virginia	600	31	33	11	7	682	0	682
Washington	12	5	3	0	0	20	4	24
W. Va.	507	322	230	78	34	1,171	155	1,326
Wyoming	30	4	6	2	2	44	13	57
Total	5,283	1,048	674	207	173	7,385	998	8,383

Appendix E

TABLE 1. - Number of regular federal inspections, surveys, and investigations of fatal coal-mine accidents completed since 1941

Fiscal year	Regular inspections			Surveys 1/				Investigations of fatal accidents
	Original	Reinspections	Total	Electrical	Explosives	Ventilation	Float dust	
1941-43	1,549	63	1,612	-	-	-	-	-
1944	886	1,339	2,225	-	-	-	-	-
1945	505	2,451	2,956	2/69	2/138	-	-	-
1946	302	2,399	2,719	19	38	-	-	-
1947	445	3,540	3,985	21	35	5	-	-
1948	414	4,247	4,661	10	20	5	16	-
1949	1,779	4,895	6,674	5	9	2	5	-
1950	2,184	5,999	8,183	18	0	6	4	189
1951	1,810	7,161	8,971	19	2	3	10	669
Total	9,892	32,094	41,986	161	242	21	35	858

1/ Includes those surveys that personnel of the branch made or assisted in making.
2/ Covers fiscal years 1942-45, inclusive.

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TABLE 2. - Average number of times coal mines were inspected, fiscal year ended June 30, 1951

State	Mines inspected				Inspections made				Average annual inspections made per mine			
	A	B	C	Total	A	B	C	Total	A	B	C	All mines
Alabama	361	60	23	444	490	94	26	610	1.4	1.6	1.1	1.4
Alaska	0	0	0	0	0	0	0	0	-	-	-	-
Arizona	4	-	-	4	5	-	-	5	1.2	-	-	1.2
Arkansas	22	17	5	44	30	25	6	61	1.4	1.5	1.2	1.4
Colorado	176	37	6	219	286	70	6	362	1.6	1.9	1.0	1.7
Georgia	4	-	-	4	4	-	-	4	1.0	-	-	1.0
Idaho	-	-	-	-	-	-	-	-	-	-	-	-
Illinois	97	112	48	257	139	215	55	409	1.4	1.9	1.1	1.6
Indiana	63	24	43	130	96	50	47	193	1.5	2.1	1.1	1.5
Iowa	23	10	21	54	23	10	21	54	1.0	1.0	1.0	1.0
Kansas	5	3	6	14	7	3	6	16	1.4	1.0	1.0	1.1
Kentucky	868	317	23	1,208	944	553	26	1,523	1.1	1.7	1.1	1.3
Maryland	38	4	0	42	45	4	0	49	1.2	1.0	-	1.2
Michigan	0	1	-	1	0	1	0	1	-	1.0	-	1.0
Missouri	34	11	11	56	43	19	11	73	1.3	1.7	1.0	1.3
Montana	61	5	18	84	63	13	18	94	1.0	2.6	1.0	1.1
New Mexico	47	7	1	55	80	12	1	93	1.7	1.7	1.0	1.7
North Carolina	-	1	-	1	-	2	-	2	-	2.0	-	2.0
North Dakota	0	1	11	12	0	2	11	13	-	2.0	1.0	1.1
Ohio	212	60	46	318	279	85	46	410	1.3	1.4	1.0	1.3
Oklahoma	18	8	8	34	25	16	8	49	1.4	2.0	1.0	1.4
Oregon	3	-	-	3	5	-	-	5	1.7	-	-	1.7
Pa. (Anth.)	199	182	148	529	321	370	148	839	1.6	2.0	1.0	1.6
Pa. (Bit.)	515	349	93	957	667	609	102	1,378	1.3	1.7	1.1	1.4
Tennessee	349	44	28	421	367	70	29	466	1.1	1.6	1.0	1.1
Texas	0	-	-	0	0	-	-	0	-	-	-	-
Utah	51	16	-	67	100	49	-	149	2.0	3.0	-	2.2
Virginia	197	74	-	271	204	126	-	330	1.0	1.7	-	1.2
Washington	17	8	5	30	16	16	5	37	1.0	2.0	1.0	1.2
West Virginia	461	579	7	1,047	598	1,036	17	1,651	1.3	1.8	2.4	1.6
Wyoming	28	14	12	54	42	40	13	95	1.5	2.9	1.1	1.8
Total	3,853	1,944	563	6,360	4,879	3,490	602	8,971	1.3	1.8	1.1	1.4

A - Underground coal mines employing less than 25 men.
B - Underground coal mines employing 25 and more men.
C - Strip coal mines regardless of employment.

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TABLE 3. - Average actual time required to inspect coal mines and prepare the inspection reports, fiscal year ended June 30, 1951

Region	Health and Safety Division field headquarters	For underground mines employing: 1 - 24		25 - 99		100 - 299		300 - 499		500 plus		Strip mines		Average		Total
		A	B	A	B	A	B	A	B	A	B	A	B	A	B	
I	Anchorage, Alaska															
II	Seattle, Washington	1.1	.6	2.2	0.6	4.7	0.9	-	-	-	-	0.9	0.3	1.5	0.6	2.1
IV	Denver, Colorado	1.4	1.0	2.8	1.2	3.9	1.1	5.5	1.4	8.2	1.2	1.7	.7	1.7	1.0	2.7
	Salt Lake City, Utah	1.2	.5	2.9	.6	2.8	.7	4.4	1.0	7.5	2.0	.9	.5	2.2	.7	2.9
	Phoenix, Arizona	.8	1.0	1.0	1.0	-	-	-	-	-	-	-	-	.8	1.0	1.8
V	Duluth, Minnesota	1.9	1.0	2.2	1.0	3.8	1.2	-	-	-	-	2.0	1.4	2.1	1.2	3.3
VI	McAlester, Oklahoma	1.5	1.7	2.2	1.7	3.3	1.8	5.1	1.9	-	-	1.2	1.1	1.9	1.6	3.5
VII	Birmingham, Alabama	.9	.7	2.3	.6	3.3	.6	5.0	.6	7.0	.6	1.1	.7	1.3	.6	1.9
	Jellico, Tennessee	.9	.8	2.9	1.2	5.4	1.3	10.2	1.9	-	-	.8	.7	1.4	.9	2.3
VIII	Pittsburgh, Pennsylvania	1.6	1.1	2.5	1.1	4.5	1.1	6.5	1.1	9.6	1.1	1.3	.6	3.0	1.1	4.1
	Johnstown, Pennsylvania	1.3	1.0	2.3	1.0	4.9	1.1	8.4	1.2	11.9	1.2	1.5	.7	2.6	1.0	3.6
	St. Clairsville, Ohio	1.0	1.1	1.7	1.1	4.2	1.2	5.9	1.2	7.4	1.0	1.1	.7	1.6	1.0	2.6
	Fairmont, West Virginia	1.8	1.1	2.9	1.1	4.4	1.1	7.4	1.0	8.8	1.0	1.6	1.1	2.6	1.1	3.7
	Mt. Hope, West Virginia	1.0	1.0	1.7	.9	3.6	.9	5.7	.9	8.4	1.1	-	-	2.7	.9	3.6
	Norton, Virginia	.9	.9	1.6	1.0	3.5	1.0	5.9	1.1	11.4	1.6	-	-	1.7	1.0	2.7
	Vincennes, Indiana	1.4	.9	2.0	1.0	4.3	1.0	6.1	1.2	11.0	1.3	1.3	.7	2.5	.9	3.4
	Wilkes-Barre, Pennsylvania	1.0	.9	1.8	1.0	4.4	1.2	8.3	1.3	15.0	1.2	.6	.5	3.3	1.0	4.3
	National coverage	1.2	.9	2.1	1.0	4.0	1.0	6.4	1.1	11.1	1.2	1.1	.7	2.2	1.0	3.2

A - Average days to complete inspection. Includes inspection, travel, preparing and posting preliminary report, conference with mine personnel, and preparing data book and sampling cards.
B - Average days for inspector to prepare rough draft of final inspection report.

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Appendix F

Miscellaneous work,
Fiscal year ended June 30, 1951

Type of job	Number of miscellaneous jobs done in the various field areas																	
	Anchorage	Seattle	Denver	Salt Lake City	Phoenix	Duluth	McAlester	Birmingham	Jellico	Pittsburgh	Johnstown	St. Clairsville	Fairmont	Mt. Hope	Norton	Vincennes	Wilkes-Barre	Total
Conducting classes in mine electricity	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	8
Proposed revision of State coal-mining laws	0	0	1	1	0	0	3	0	1	0	0	0	0	0	0	0	0	6
Presenting Joseph A. Holmes Certificate of Honor	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	1	0	6
Investigating or fighting fires at operating mines	0	2	0	2	0	2	1	0	0	3	0	0	1	0	1	5	2	19
Investigating explosions	0	1	1	0	0	0	1	0	0	4	0	0	1	1	1	2	0	12
Rescue or recovery work after mine fires or explosions	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	3
Investigating underground atmospheric conditions	0	0	3	0	0	1	1	0	0	5	0	0	0	0	2	5	0	17
Haulage study	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
Ventilation study	0	1	2	0	0	0	1	0	0	1	0	0	0	0	0	1	0	6
Explosives study	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	6	0	9
Mining study	0	4	2	1	0	0	0	0	1	7	1	2	0	0	0	9	1	28
Electrical study	0	0	0	0	0	1	0	9	0	17	1	0	0	0	0	14	0	42
Atmospheric-dust study	0	0	0	0	0	0	1	1	1	2	0	0	0	0	1	1	0	7
Rock-dusting study	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Checking serious hazards in mines	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Special work on fires in inactive coal deposits	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	2	11
Attending hearings, court proceedings, and inquests	0	1	0	0	0	0	1	0	0	2	2	1	0	0	0	5	0	12
Attending safety meetings and institutes	0	1	8	0	0	6	1	0	19	2	1	6	65	0	0	44	0	153
Safety address and demonstrations	0	0	4	0	0	1	8	0	5	6	1	4	0	0	0	7	0	36
Conducting classes in first aid or mine rescue	0	5	9	0	0	7	0	0	3	8	0	0	0	0	0	11	0	43
Examining classes in first aid or mine rescue	0	0	1	0	0	3	0	0	2	6	0	0	0	0	0	9	0	21
Investigation of health and welfare conditions at mines	0	0	4	0	0	2	0	0	0	0	0	0	0	0	0	0	0	6
Special investigations for Joint Industry Safety Committee	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
Preparation of manuscript for publication	0	0	2	0	0	0	0	3	0	3	0	0	0	0	0	0	0	8
Checking fire seals and sealing underground fires	0	0	3	1	0	0	0	0	0	0	0	0	3	0	2	3	0	12
Accompanying visitors to mines	0	0	1	0	0	0	0	0	0	5	0	0	0	0	0	5	0	11
Conveyor belt study	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Judging first-aid contest	0	1	1	0	0	0	0	0	2	10	0	0	0	0	0	4	0	18
Assisting State Inspection Department	0	0	1	0	0	0	0	0	2	3	0	1	0	0	0	1	0	8
Other miscellaneous jobs	0	5	6	1	0	1	0	0	9	30	3	0	0	0	1	17	16	89

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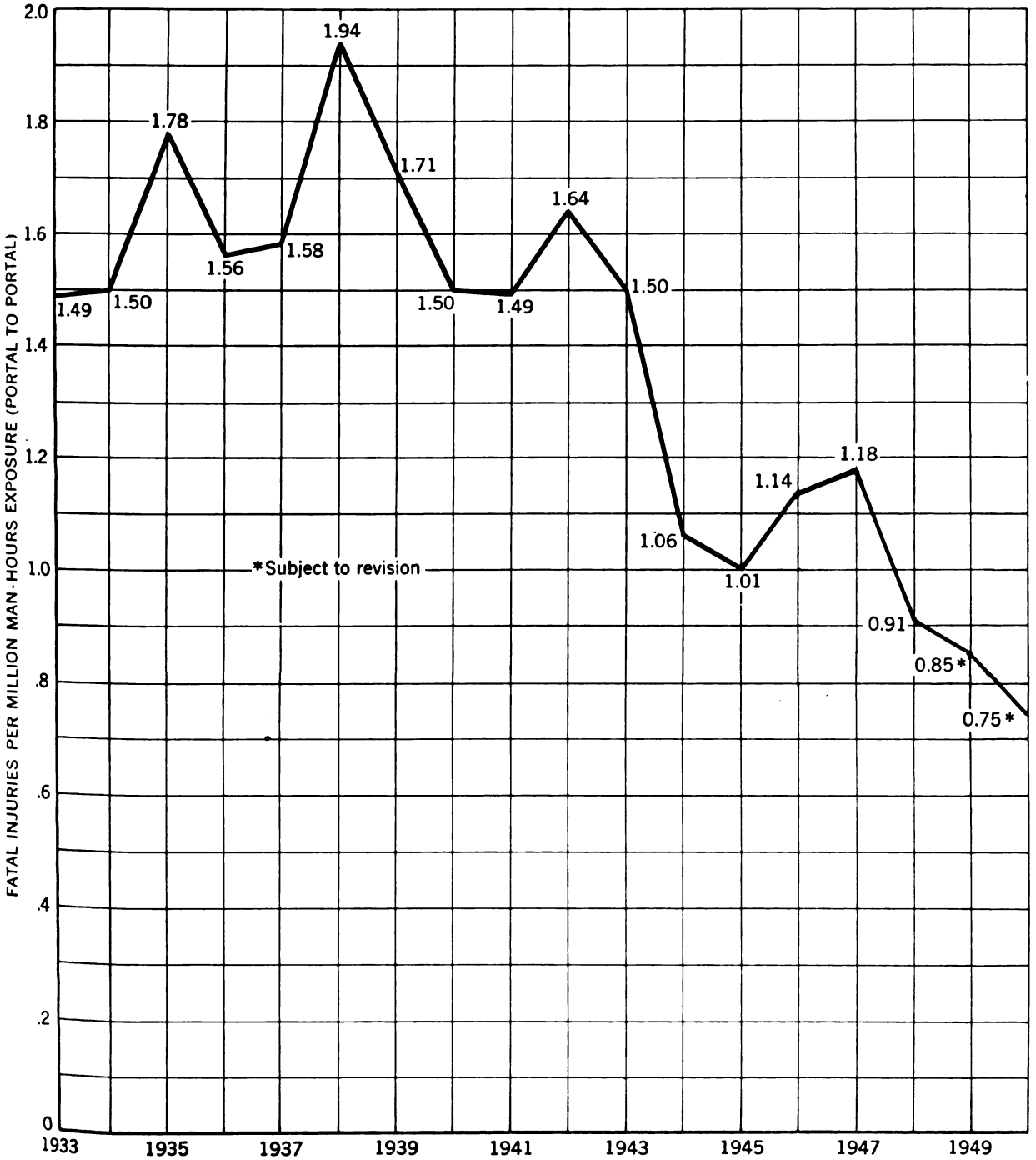

Figure 1. - Fatality rates in anthracite mines of Pennsylvania.

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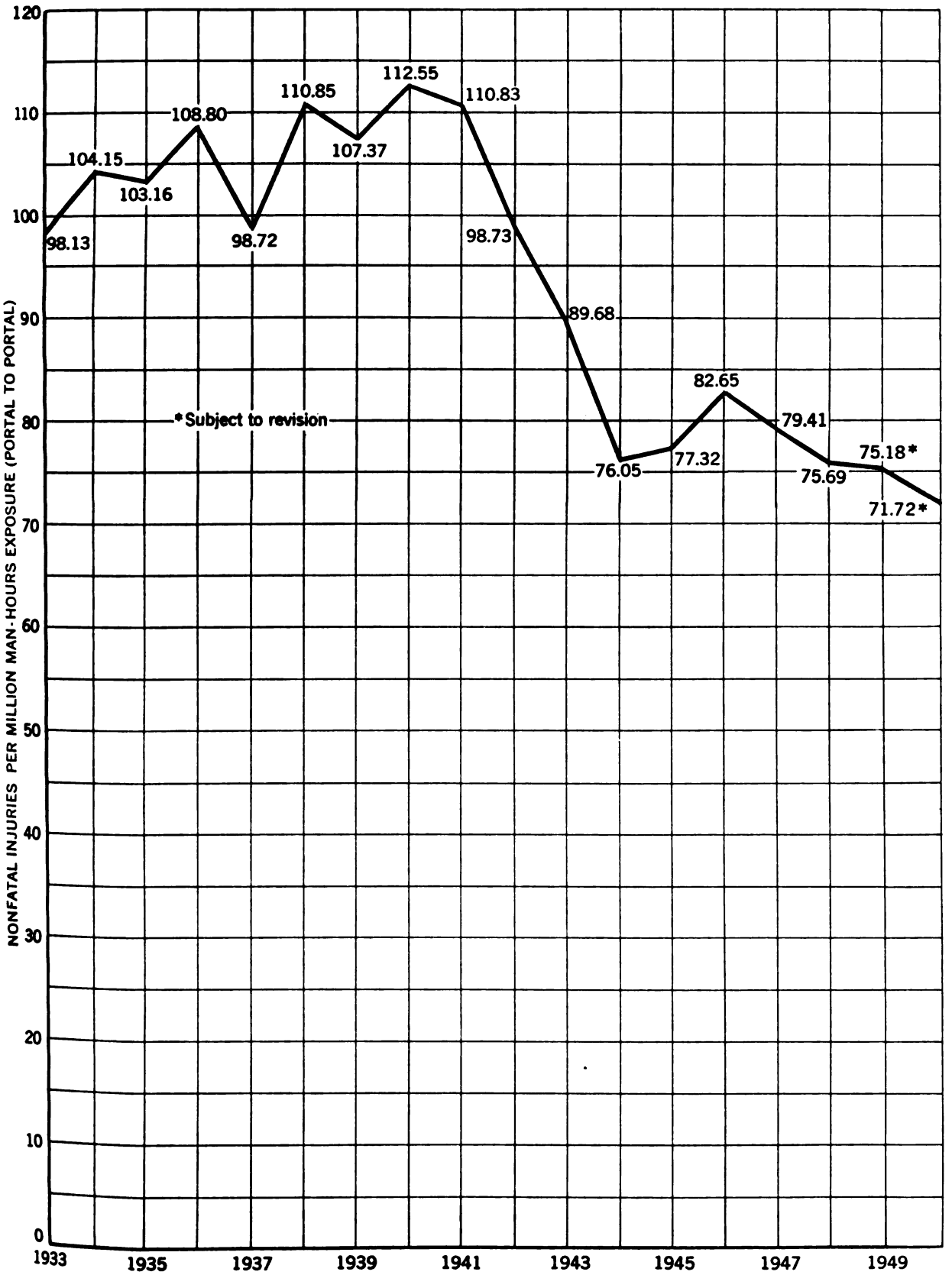

Figure 2. - Nonfatal injury rates in anthracite mines of Pennsylvania.

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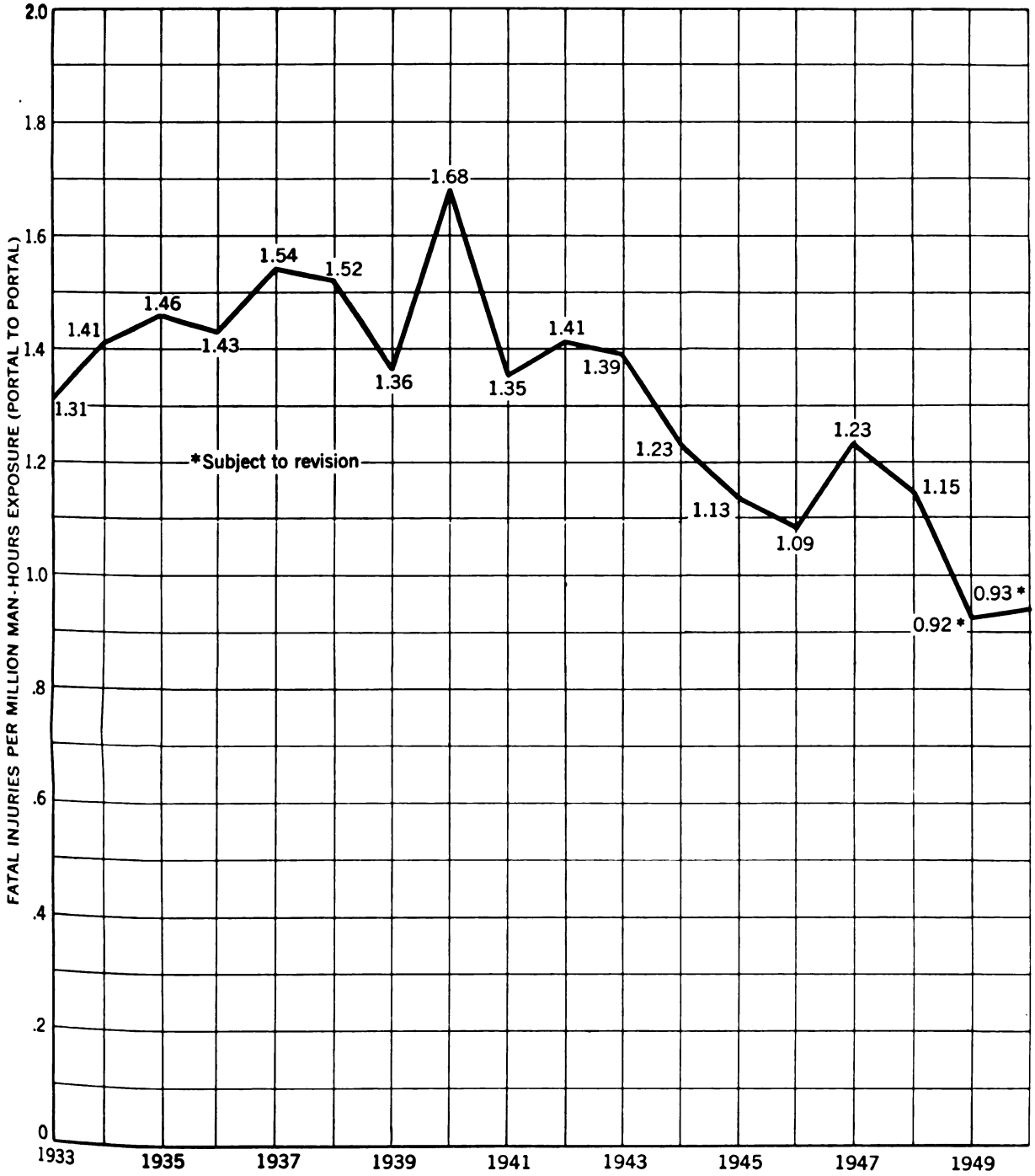

Figure 3. - Fatality rates in bituminous-coal mines of the United States.

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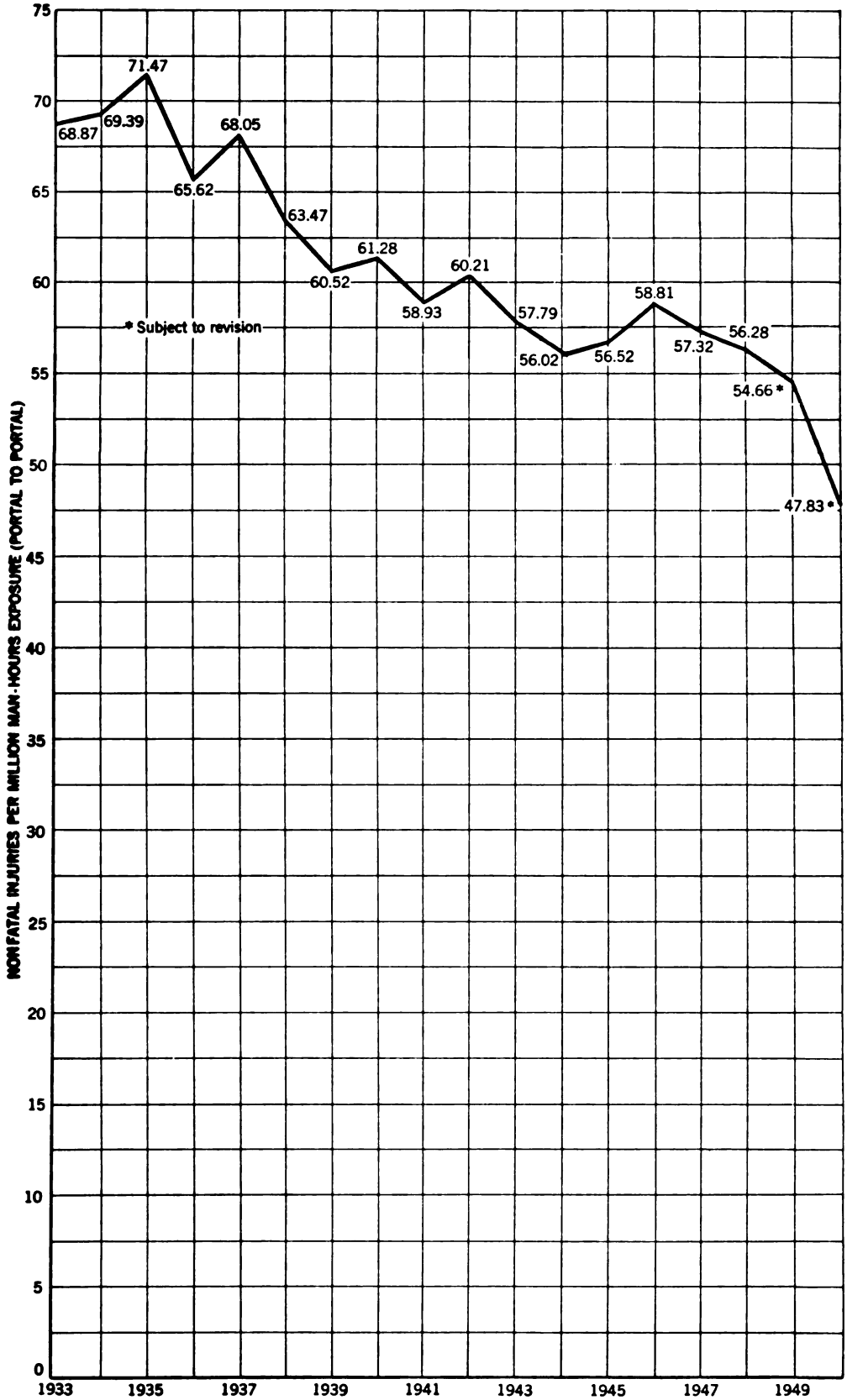

Figure 4. - Nonfatal injury rates in bituminous-coal mines of the United States.

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Appendix G

TABLE 1. - Average injuries per million man-hours exposure (portal to portal)

Year	Fatals	Nonfatals	Man-hours	Rate	
				Fatal	Nonfatal
BITUMINOUS					
1933-41, incl.	9,078	407,787	6,252,659,625	1.45	65.22
1942-50, incl.[1]	8,205	388,555	6,904,741,399	1.19	56.27
ANTHRACITE					
1933-41, incl.	2,046	134,368	1,271,149,980	1.61	105.71
1945-50, incl.[2]	1,437	103,166	1,274,187,656	1.13	80.97

1/ 1950 data are preliminary.
2/ 1949 and 1950 data are preliminary.

TABLE 2. - Major coal-mine disasters in the United States

Calendar year	Number of major disasters	Number of persons killed
1933	1	7
1934	2	22
1935	4	35
1936	5	37
1937	6	101
1938	6	84
1939	1	28
1940	6	276
1941	8	73
1942	7	132
1943	8	174
1944	4	94
1945	5	68
1946	2	27
1947	6	179
1948	6	49
1949	0	0
1950	0	0
1951 (6 months)	2	16

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Appendix H

Number of coal mines in the United States in which major improvements were made, fiscal year ended June 30, 1951

Improvement Item	Ala.	Ariz.	Ark.	Colo.	Ga.	Idaho	Ill.	Ind.	Ia.	Kans.	Ky.	Md.	Mich.	Mo.	Mont.	N. Mex.
1. Systematic roof-support plan adopted	5	0	2	9	1	-	17	11	3	1	43	5	0	2	1	3
2. Roof-support plan enforced	45	0	6	11	1	-	44	25	2	1	137	8	0	1	3	14
3. Black powder discontinued	18	1	6	22	0	-	2	1	1	0	30	6	0	0	3	0
4. New main fan installed	12	0	2	6	0	-	11	5	0	0	78	2	0	4	4	2
5. Ventilation generally improved	27	1	8	33	0	-	58	24	6	2	157	9	1	6	2	8
6. Auxiliary blower fans removed	1	0	3	2	0	-	3	0	0	0	12	0	0	0	0	0
7. Preshift examinations for gas begun	10	1	5	13	0	-	12	4	0	2	36	0	0	0	1	5
8. Onshift examinations for gas begun	4	0	1	6	0	-	11	3	0	0	9	0	0	0	0	4
9. Use of water to allay dust started	0	0	0	2	0	-	6	2	0	0	5	1	0	0	0	0
10. Mine rock dusted for first time	6	0	5	9	0	-	3	1	0	1	37	4	0	0	9	4
11. General improvement in rock dusting	3	2	6	34	0	-	62	20	0	1	137	2	0	0	10	13
12. General improvement in haulage conditions and practices	6	0	1	1	0	-	30	17	4	0	22	1	1	0	3	3
13. Installation of protective devices for electric equipment and circuits	12	0	9	20	0	-	49	34	2	3	67	6	1	2	1	4
14. Second opening provided	12	0	2	1	0	-	10	4	0	0	21	2	0	1	3	2
15. Smoking in mine discontinued	5	0	6	14	0	-	5	4	0	0	13	1	0	0	3	3
16. Use of open lights discontinued	2	0	9	8	0	-	5	1	0	0	26	1	0	0	5	3

Improvement Item	N. Car.	N. Dak.	Ohio	Okla.	Ore.	Pa. Anth.	Pa. Bit.	Tenn.	Texas	Utah	Va.	Wash.	W. Va.	Wyo.	Total	Total fiscal years 1941-51 incl.
1. Systematic roof-support plan adopted	0	0	20	2	0	0	29	21	-	3	3	0	52	1	234	1,866
2. Roof-support plan enforced	0	0	40	3	1	135	148	31	-	9	37	0	232	23	957	1/
3. Black powder discontinued	0	1	13	0	0	6	54	13	-	0	11	0	1	3	192	1,037
4. New main fan installed	0	0	33	1	0	5	62	16	-	9	10	2	81	1	346	2,010
5. Ventilation generally improved	0	1	66	6	0	70	139	38	-	17	28	1	150	10	868	1/
6. Auxiliary blower fans removed	0	0	1	1	0	0	3	2	-	1	2	0	0	0	31	473
7. Preshift examinations for gas begun	0	1	11	4	0	10	45	17	-	2	12	1	78	3	273	2,147
8. Onshift examinations for gas begun	0	0	9	3	0	7	15	4	-	2	2	0	22	2	104	1,688
9. Use of water to allay dust started	0	0	5	0	0	16	12	0	-	4	2	0	24	2	81	867
10. Mine rock dusted for first time	0	0	8	0	0	-	23	2	-	1	12	0	26	3	154	1,407
11. General improvement in rock dusting	0	0	13	2	0	-	61	11	-	27	28	1	162	15	610	1/
12. General improvement in haulage conditions and practices	0	0	50	0	0	99	41	3	-	5	7	0	210	9	513	1/
13. Installation of protective devices for electric equipment and circuits	0	4	148	3	0	139	84	3	-	14	13	1	306	13	938	1/
14. Second opening provided	0	0	24	0	0	11	9	11	-	0	4	1	28	0	146	660
15. Smoking in mine discontinued	0	0	4	1	0	21	35	2	-	3	6	0	37	6	169	1,186
16. Use of open lights discontinued	0	0	10	3	0	15	27	5	-	3	1	0	38	2	164	1,049

1/ Grand totals not given for these items because further improvements may have been made in some mines previously reported as showing improvements.

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Appendix I

Coal mines found free of violations of Federal Mine Safety Code for Bituminous-Coal and Lignite Mines and of the Safety Standards for Anthracite Mines at time Federal inspection was being made

(Fiscal year ending June 30, 1951)

State	Mine	Company
Alabama	Black Diamond #1-2	Black Diamond Coal Mining Co.
Do.	Docena	Tennessee Coal Iron and Railroad Co.
Do.	Edgewater	Do.
Do.	Short Creek #19	Do.
Do.	Mulga	Woodward Iron Co.
Do.	Sayre	Republic Steel Corp.
Illinois	Buckhorn No. 2	The Consolidated Coal Co.
Do.	Carmac	Carmac Coal Co.
Do.	1/Delta	Delta Collieries Corp.
Montana	1/Rosebud	Foley Bros.
Do.	1/Toman	J. Fred Toman, Licensee
New Mexico	Defiance No. 1	Defiance Coal Co.
Pa.-Anth.	B-Vein Slope	Biscontini and Sons Coal Co.
Do.	Mills Slope	Do.
Do.	No. 92 Slope	Do.
Do.	1/T-No. 2	Jeddo-Highland Coal Co.
Pa.-Bit.	Kyle	United States Steel Corp. Coal Div.
Do.	Sager	J. L. Sager Coal Co.
Utah	McGowan	National Coal Co.
Do.	Clear Creek No. 3	Utah Fuel Co.
Do.	Columbia	Geneva Steel Co.
Virginia	No. 32	Pocahontas Corp.
West Virginia	Coalburg	Red Jacket Coal Corp.
Do.	Coal Mountain	Do.
Do.	Rolph	Pocahontas Fuel Co., Inc.
Wyoming	Miller	Sheridan-Wyoming Coal Co.
Do.	Winton Nos. 1 and 7-1/2	The Union Pacific Coal Co.

1/ Strip mines.

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Appendix J

Record of compliance with recommendations of Federal coal-mine inspectors

State	12/1/41 to 6/30/46	7/1/46 to 6/30/47	7/1/47 to 6/30/48	7/1/48 to 6/30/49	7/1/49 to 6/30/50	7/1/50 to 6/30/51
Alabama		20	41	12	13	11
Alaska		-	-	-	20	-
Arizona		26	66	33	28	38
Arkansas		18	24	15	23	19
Colorado		39	53	31	45	42
Georgia		-	-	-	1	6
Idaho		-	-	-	0	-
Illinois		17	38	24	32	22
Indiana		17	37	23	31	27
Iowa		14	13	12	10	14
Kansas		1	7	9	15	16
Kentucky		23	35	18	21	19
Maryland		7	45	31	23	25
Michigan		27	36	20	7	41
Missouri		10	26	8	3	10
Montana		23	28	27	17	28
New Mexico		30	46	33	50	49
North Carolina		-	-	-	0	22
North Dakota		36	47	40	39	49
Ohio		27	39	22	16	23
Oklahoma		20	24	21	25	23
Oregon		-	49	-	0	39
Pa. (Anth.)		25	25	31	41	26
Pa. (Bit.)		41	59	38	35	40
Tennessee		8	29	11	13	13
Texas		-	-	-	-	-
Utah		35	52	42	60	55
Virginia		29	37	23	16	23
Washington		41	37	26	40	32
West Virginia		33	41	39	43	44
Wyoming		31	45	26	49	45
National average	25	25	41	28	30	27

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Appendix K

Violations of the Federal Mine Safety Code for Bituminous Coal and Lignite Mines and of the Safety Standards for Anthracite Mines

(Fiscal year ended June 30, 1951)

State	Number of mines inspected	Number of violations reported[1]	Average number of violations per mine inspected
Alabama	444	9,666	22
Alaska	0	-	-
Arizona	4	18	5
Arkansas	44	1,978	45
Colorado	219	2,411	11
Georgia	4	81	20
Idaho	-	-	-
Illinois	257	5,075	20
Indiana	130	2,307	18
Iowa	54	888	16
Kansas	14	605	43
Kentucky	1,208	30,731	25
Maryland	42	685	16
Michigan	1	19	19
Missouri	56	1,862	33
Montana	84	845	10
New Mexico	55	443	8
North Carolina	1	28	28
North Dakota	12	72	6
Ohio	318	6,615	21
Oklahoma	34	1,182	35
Oregon	3	33	11
Pa. (Anth.)	529	4,872	9
Pa. (Bit.)	957	13,708	19
Tennessee	421	9,357	22
Texas	0	-	-
Utah	67	835	12
Virginia	271	6,971	26
Washington	30	264	9
West Virginia	1,047	19,461	19
Wyoming	54	602	11
National average	6,360	121,614	19

[1] These include all violations found during first inspections made during the year and all new violations found during subsequent inspections.

Int. - Bu. of Mines, Pgh., Pa.

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